CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 27-20

Insert facing 27-4-13, Page 203, dated Aug. 27/62 (or subsequent).

The instructions on the noted facing page are to be used for all applicable airplanes except as follows: for airplanes not modified per Service Bulletin No. 27-3, delete the instructions where indicated.

Retain this Temporary Revision in your manual until all applicable airplanes have been modified per noted Service Bulletin.

Delete section 2. Removal/Installation - Individual Flap Asymmetry Switch Assembly.

FLAP ASYMMETRY SWITCHES AND POSITION TRANSMITTER ASSEMBLIES - MAINTENANCE PRACTICES

1. Removal/Installation - Flap Drive Asymmetry Switch Assembly (see Figure 201)

A. General.

Each flap drive asymmetry switch assembly consists of a flap position transmitter and an asymmetry switch.

B. Equipment Required. None.

C. Remove Flap Drive Asymmetry Switch Assembly

(1) Open FLAP ASYM CONT and FLAP POS IND circuit breakers on main circuit breaker panel.

(2) Open shroud door on under surface of wing in line with asymmetry switch to be removed.

(3) Disconnect electrical connectors from asymmetry switch and flap position transmitter.

(4) Remove three mounting bolts attaching asymmetry switch assembly to structure.

(5) Remove asymmetry switch and drive shaft assembly by sliding unit outboard to disengage splined shaft from flap actuator drive.

D. Install Flap Drive Asymmetry Switch Assembly.

(1) Manually actuate flaps to "full down" position and set flap control lever in 50° detent.

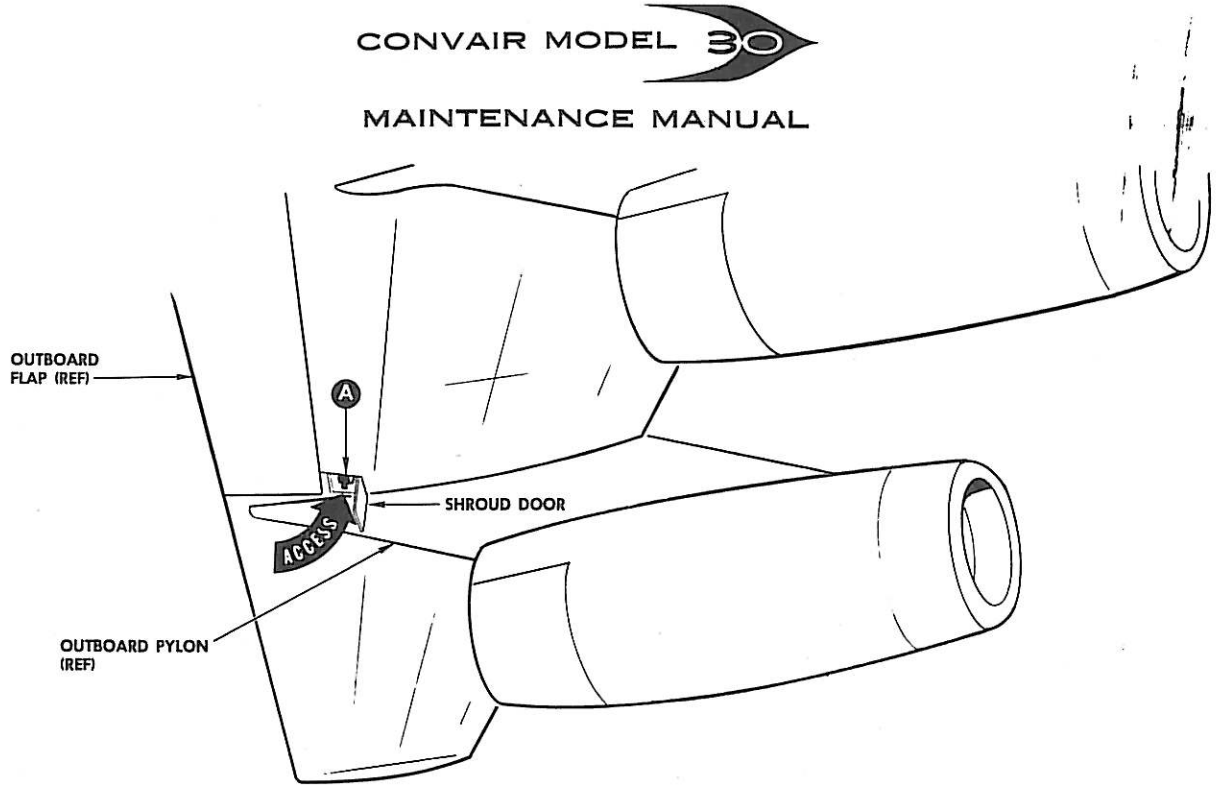
NOTE: When flaps are in "full down" position, aft rollers on flap main carriages should be a minimum of 0.70 inch from making contact with emergency stops on lower flap tracks.

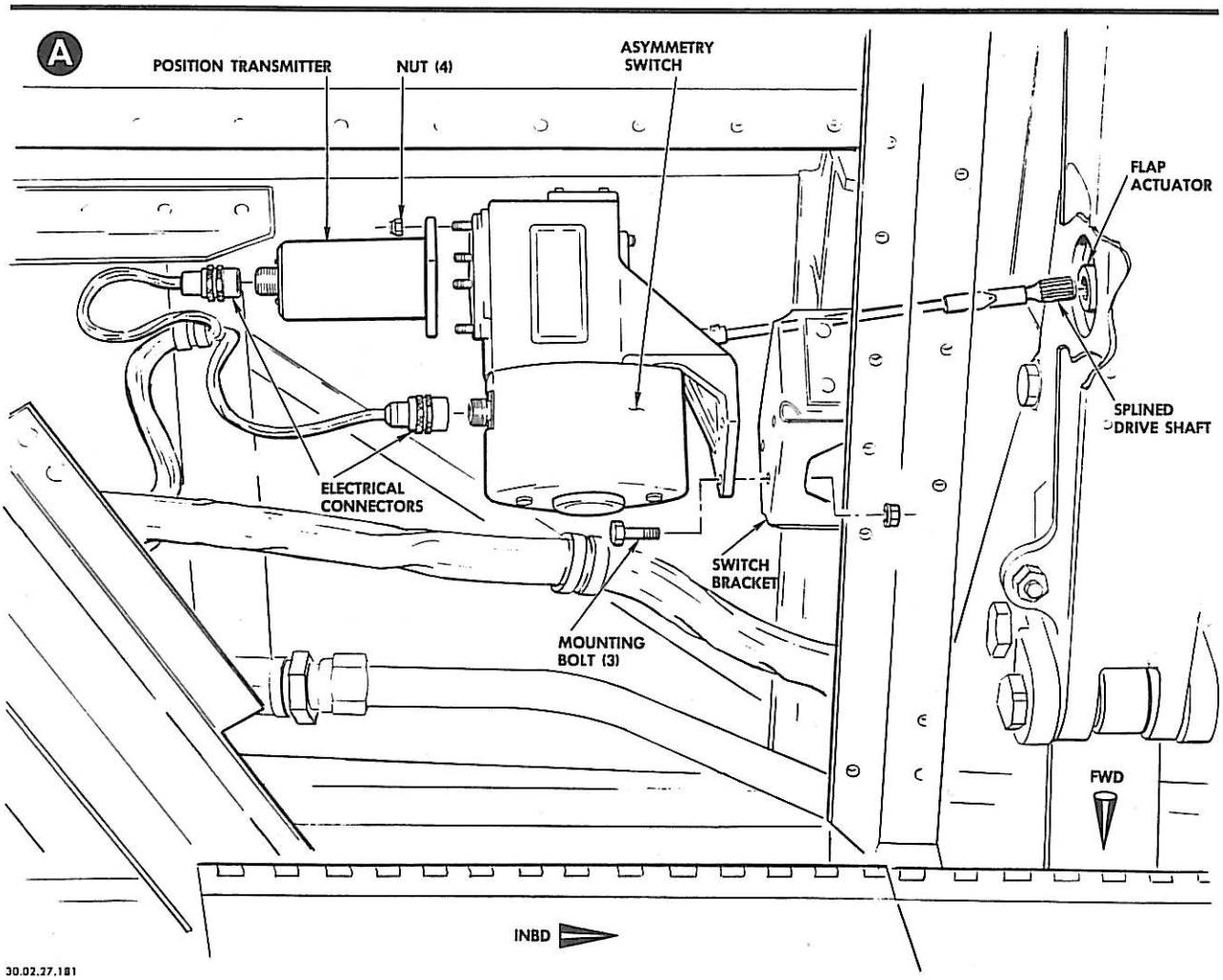
(2) If installing asymmetry switch in LH wing, rotate switch drive shaft and align the letter "L" with index mark on case. If installing switch in RH wing, align the letter "R" with index mark on case.

(3) Insert switch splined drive shaft into flap actuator drive, position asymmetry switch assembly on bracket, and install three mounting bolts.

(4) Install electrical connectors on asymmetry switch and position transmitter.

(5) Test flap asymmetry switches (refer to 27-4-13, Adjustment/Test - Flap Asymmetry Switches).





Wing Flap Drive Asymmetry Switch and Position Transmitter Assembly Installation
Figure 201

(6) Adjust and test flap position transmitter (refer to 27-4-13, Adjustment/Test - Flap Position Transmitters).

2. Removal/Installation - Individual Flap Asymmetry Switch Assembly (see Figure 202)

A. General.

An individual flap asymmetry switch assembly is mounted on the wing trailing edge forward of each flap and is connected to the associated flap by two switch cables.

B. Equipment Required.

(1) External source of electrical power.

(2) External source of hydraulic power.

C. Remove Individual Flap Asymmetry Switch Assembly.

(1) Open access doors in under surface of wing trailing edge in line with flap connected to switch assembly being removed.

(2) Connect external source of electrical power to airplane and close FLAP ASYM CONT circuit breaker on main circuit breaker panel (refer to Chapter 24, ELECTRICAL POWER).

(3) Check that FLAP PWR SELECT switch on overhead switch panel is positioned on NORMAL #1 and that setting of flap control lever corresponds roughly with position of flaps.

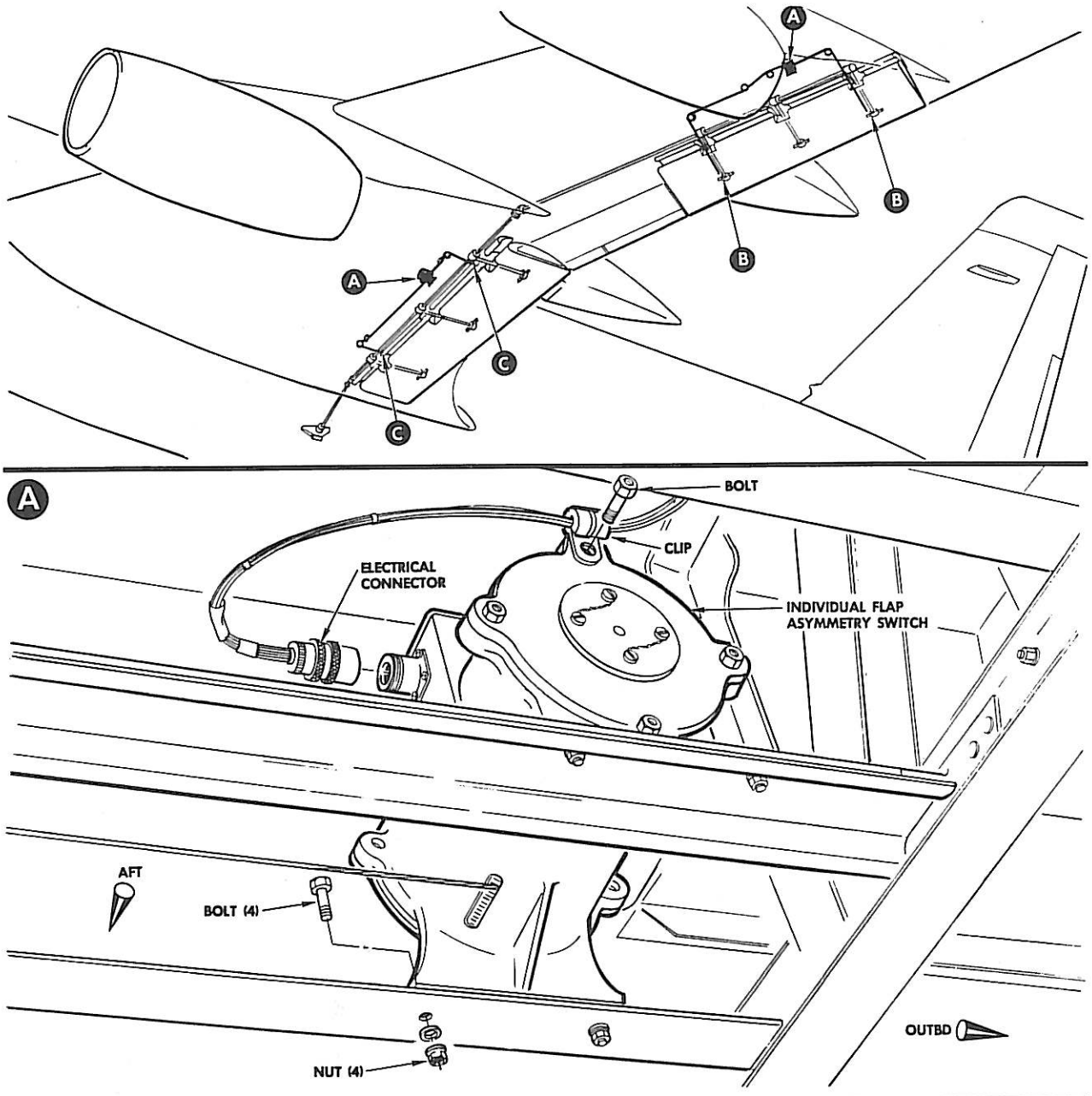
(4) Connect external source of hydraulic power to airplane and pressurize both hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

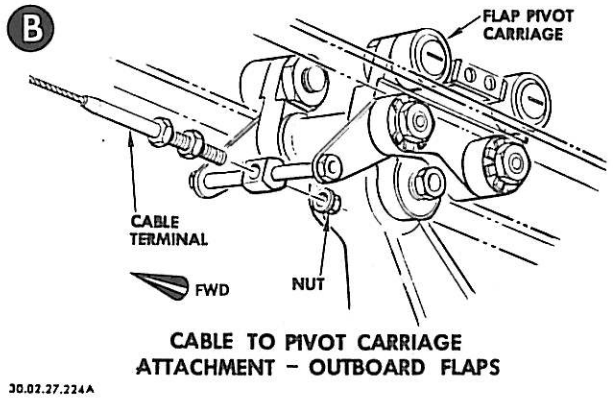
CAUTION: DO NOT OPERATE FLAPS WHEN BOTH HYDRAULIC SYSTEMS ARE PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE, AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(5) Actuate flap control lever to 0° detent and raise flaps to "full up" position.

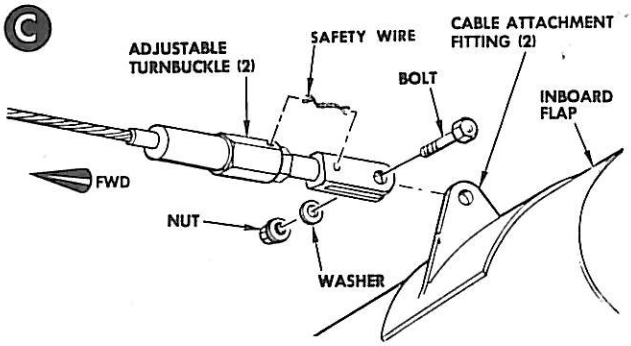
(6) Loosen asymmetry switch cables and disconnect from flap.

NOTE: Inboard flap asymmetry switch cables are attached to fittings on the flap leading edge by terminal turnbuckles. Outboard flap asymmetry switch cables are attached to the inboard and outboard flap pivot carriages and are adjusted by stop nuts on threaded cable terminals.





CABLE TO PIVOT CARRIAGE ATTACHMENT – OUTBOARD FLAPS



CABLE TO FLAP ATTACHMENT – INBOARD FLAPS

30.02.27.224A

Wing Individual Flap Asymmetry Switch Installation
(Applicable to airplanes incorporating
Service Bulletin No. 27-3)
Figure 202

WARNING: USE EXTREME CARE WHEN DISCONNECTING CABLES AS THEY ARE SPRING LOADED WITH A TENSION OF ABOUT 20 POUNDS.

(7) Remove asymmetry switch cables from cable pulleys.

NOTE: If removing inboard flap asymmetry switch assembly, it will be necessary to remove cable guards from inboard pulleys to allow turnbuckles to pass around pulleys.

(8) Open FLAP ASYM CONT circuit breaker and disconnect electrical connector from asymmetry switch assembly.

(9) Remove bolt from clip attaching wiring to asymmetry switch.

(10) Take out four mounting bolts and remove asymmetry switch assembly from wing trailing edge.

D. Install Individual Flap Asymmetry Switch Assembly.

(1) Position asymmetry switch assembly on brackets in wing trailing edge and install four mounting bolts.

NOTE: The short cable extends outboard from both the inboard and outboard flap asymmetry switch assemblies.

(2) Thread cables around pulleys. Install pulley keepers if installing inboard flap asymmetry switch assembly.

(3) Connect cables to leading edge of inboard flap, or to flap pivot carriages of outboard flaps, and adjust length of cables to position pointers at aft end of switch assembly straight up.

(4) Check that each switch in switch assembly actuates when cable is pulled from 0.75 to 1.0 inch out of slot in switch housing. Safety turnbuckles or lock nuts as appropriate.

(5) Clip wiring to asymmetry switch.

(6) Install electrical connector on asymmetry switch assembly and close FLAP ASYM circuit breaker.

(7) Test flap asymmetry switches (refer to 27-4-0, Adjustment/Test Flap Control System Functional Test).

NOTE: If an individual flap asymmetry switch only has been replaced and no other rigging or adjustment has been changed, check flap control system operation per 27-4-0, steps 2.F.(10) through 2.F.(14).

3. Adjustment/Test - Flap Asymmetry Switches

A. Equipment Required.

(1) External source of hydraulic power.

(2) External source of electrical power.

B. Test Flap Asymmetry Switches.

(1) Clear all obstructions from area that might cause damage to trailing edge flaps, leading edge flaps, or slats.

(2) Check that flap control lever setting corresponds roughly with position of flaps, and that FLAP PWR SELECT swi ch is positioned on NORMAL #1.

(3) Connect external source of electrical power to airplane and close FLAP ASYM CONT circuit breaker on main circuit breaker panel (refer to Chapter 24, ELECTRICAL POWER).

(4) Connect external source of hydraulic power to airplane and pressurize both hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

CAUTION: DO NOT OPERATE FLAPS WHEN BOTH HYDRAULIC SYSTEMS ARE PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE, AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(5) Momentarily actuate FLAP ASYM switch on pilots' pedestal to SW TEST position and check that FLAP ASYM warning light illuminates. Release switch and check that FLAP ASYM warning light extinguishes.

(6) Actuate flap control lever to 50° detent. While flaps are moving, actuate FLAP ASYM switch to RELAY TEST position and check that FLAP ASYM warning light illuminates and that flaps immediately stop moving.

(7) Release FLAP ASYM switch and check that FLAP ASYM warning light extinguishes and that flaps move smoothly "full down" position.

(8) Actuate FLAP PWR SELECT switch to ALTERNATE #2 position.

(9) Actuate flap control lever to 0° detent. While flaps are moving, actuate FLAP ASYM switch to RELAY TEST position and check that FLAP ASYM warning light illuminates and that flaps immediately stop moving.

(10) Release FLAP ASYM switch and check that FLAP ASYM warning light extinguishes and that flaps move smoothly to "full up" position.

(11) Return FLAP PWR SELECT switch to NORMAL #1 position.

(12) Adjust and test flap position transmitter (refer to Adjustment/ Test - Flap Position Transmitters).

4. Removal/Installation - Flap Position Transmitters (see Figure 201)

A. General.

Procedures for removing and installing flap position transmitter in the RH and in the LH wing are identical.

B. Equipment Required. None.

C. Remove Flap Position Transmitter.

(1) Open FLAP POS IND circuit breaker on main circuit breaker panel.

(2) Open shroud door in under surface of wing in line with position transmitter to be removed.

(3) Remove electrical connector from position transmitter.

(4) Remove four nuts attaching position transmitter to adjusting plate and remove transmitter.

D. Install Flap position Transmitter.

(1) Align flap position transmitter with mounting screws protruding from adjusting plate on asymmetry switch housing.

(2) Install four nuts attaching transmitter to adjusting plate.

(3) Install flap position transmitter electrical connector on transmitter.

(4) Adjust and test flap position transmitter (refer to Adjustment/ Test - Flap Position Transmitters).

5. Adjustment/Test - Flap Position Transmitters.

A. Equipment Required.

(1) External source of electrical power.

(2) External source of hydraulic power.

(3) Protractor No. 22-18000-901 for measuring travel of LH inboard flap.

B. Adjust Flap Position Transmitter.

(1) Clear all obstructions from area that might damage either leading or trailing edge flaps.

(2) Check that setting of flap control lever corresponds roughly with position of flaps and that FLAP PWR SELECT switch is positioned on NORMAL #1.

(3) Connect external source of electrical power to airplane and close FLAP ASYM CONT and FLAP POS IND circuit breakers on main circuit breaker panel (refer to Chapter 24, ELECTRICAL POWER).

(4) Connect external source of hydraulic power to airplane and pressurize both hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

CAUTION: DO NOT OPERATE FLAPS WHEN BOTH HYDRAULIC SYSTEMS ARE PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE, THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED, AND THE "FLAP PWR SELECT" SWITCH IS POSITIONED ON "NORMAL #1".

(5) Position flap control lever in 0° detent and check that flaps are in "full up" position.

(6) If flap position indicator on pilots' center instrument panel does not read 0 (±0.5) degree, remove safety wire, loosen position transmitter adjusting screws, and adjust transmitter to make indicator read 0.

(7) Tighten adjusting screws and secure with safety wire.

C. Test Flap Position Transmitter.

(1) Check that FLAP ASYM CONT and FLAP POS IND circuit breakers are closed and that FLAP PWR SELECT switch is positioned on NORMAL #1.

(2) With flap control lever in 0° detent and flaps in "full up" position, check that flap position indicator reads 0 (±0.5) degree. Install protractor No. 22-18000-901 on LH inboard flap and adjust to read 0 degrees.

(3) Actuate flap control lever progressively to 10°, 27°, 36°, and 50° detents allowing sufficient time at each detent for flaps to travel to selected position and come to a full stop.

(4) In each position, flap position indicator shall agree with reading on flap protractor within 4 degrees.

(5) Actuate flap control lever to 36°, 27°, 10° and 0° detents allowing sufficient time at each setting for flaps to travel to position selected and come to a full stop.

(6) At all flap control lever settings except 0°, flap position indicator shall agree with reading on flap protractor within 4 degrees. At 0° setting, flap position indicator shall agree with protractor reading within 0.5 degrees.

FLAP WARNING SWITCH - MAINTENANCE PRACTICES

1. Removal/Installation - Flap Warning Switch Assembly (see Figure 201)

A. Equipment Required.

(1) Index pin 22-J107-2.0.

B. Remove Flap Warning Switch Assembly.

(1) Retract flaps to "full up" position.

(2) Open WARN HORN and FLAP & AIL WARN LTS circuit breakers on main circuit breaker panel.

(3) Gain access to warning switch at forward end of hydraulic equipment compartment.

(4) Disconnect electrical connector from receptacle on switch case.

(5) Remove two switch cover mounting screws and remove switch cover.

(6) Loosen lock screw at top of yoke, and one adjusting screw on either side of yoke.

(7) Remove cotter pin, nut and washer securing yoke to drive shaft and remove yoke.

(8) Rotate cam as necessary to expose each of three mounting bolts securing switch case to flap central drive gearbox; remove bolts.

(9) Temporarily install yoke on drive shaft and secure yoke to shaft with nut.

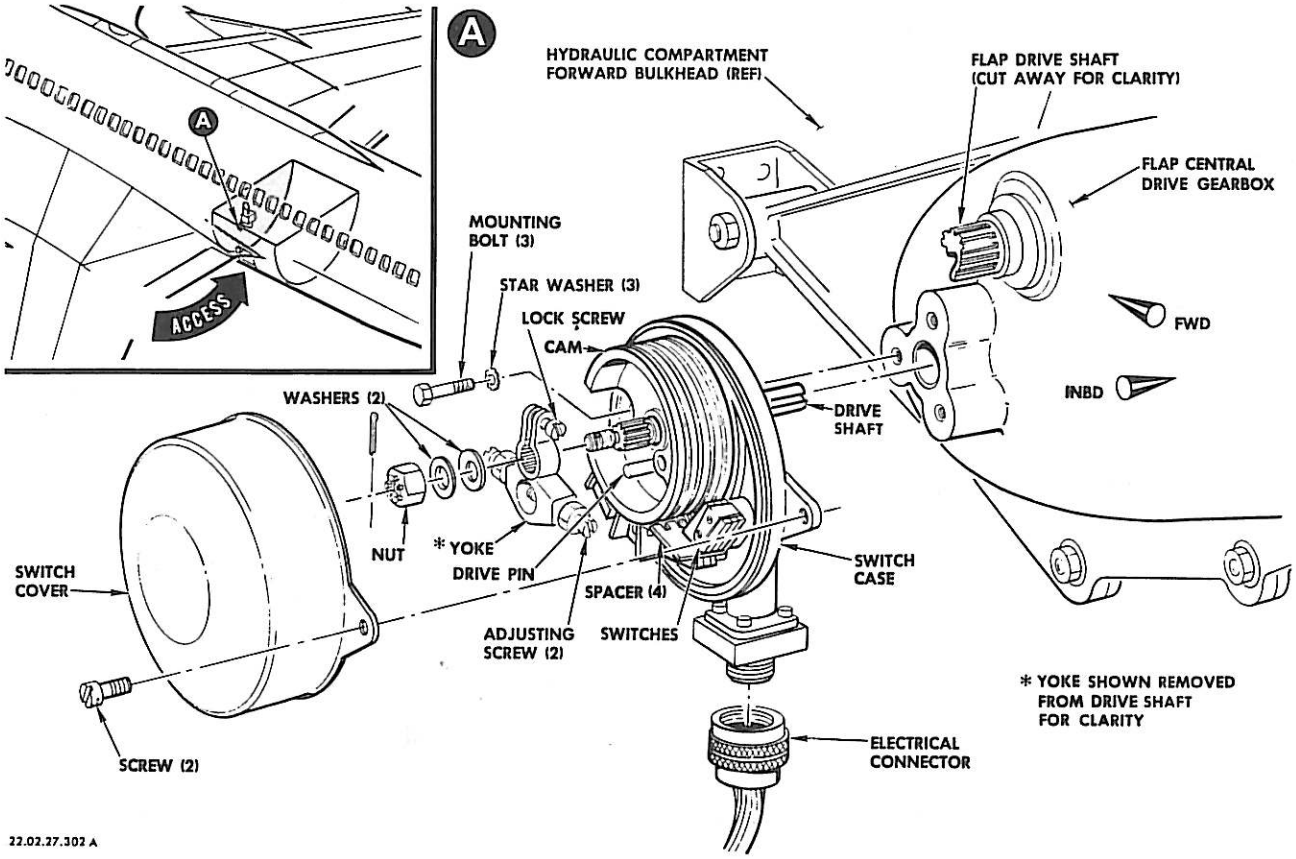
CAUTION: IN THE FOLLOWING STEP ENSURE THAT YOKE FITS SNUGLY AGAINST SWITCH CAM TO PRECLUDE MOVEMENT OF CAM WHEN REMOVING ASSEMBLY FROM GEARBOX. DAMAGE TO SWITCH ROLLERS CAN OCCUR IF CAM IS LOOSE DURING REMOVAL PROCEDURE.

(10) Remove switch assembly by pulling switch case until drive shaft is free of gearbox.

C. Install Flap Warning Switch Assembly.

(1) Remove two screws securing cover to switch case on replacement switch assembly and remove cover.

(2) Insert slotted end of switch drive shaft into bore in flap central drive gearbox; slide shaft fully in until it engages the coupling shaft in the gearbox.


A
ACCESS
HYDRAULIC COMPARTMENT FORWARD BULKHEAD (REF)
FLAP DRIVE SHAFT (CUT AWAY FOR CLARITY)
FLAP CENTRAL DRIVE GEARBOX
FWD
INBD
MOUNTING BOLT (3)
STAR WASHER (3)
LOCK SCREW
CAM
WASHERS (2)
DRIVE SHAFT
NUT
* YOKE
DRIVE PIN
SPACER (4)
SWITCH CASE
SWITCH COVER
ADJUSTING SCREW (2)
SWITCHES
SCREW (2)
ELECTRICAL CONNECTOR
* YOKE SHOWN REMOVED FROM DRIVE SHAFT FOR CLARITY
22.02.27.302 A

NOTE: It may be necessary to slowly rotate the switch cam while applying a slight pressure on the switch case until the slotted end of the drive shaft lines up with and engages the gearbox coupling shaft.

(3) Perform steps B (6) and (7) on replacement switch assembly.

(4) Rotate cam as necessary to expose each of three mounting bolt holes in switch case; align holes in switch case with holes in gearbox and install and secure mounting bolts.

(5) Rotate cam to align cam drive pin directly under the cam drive shaft.

(6) Position yoke on splined drive shaft, centering the hole located between the two adjusting screws over the cam drive pin; slide yoke onto drive shaft and tighten lock screw at top of yoke and adjusting screw at side of yoke.

(7) Check that flaps are in "full up" position and attempt to insert index pin 22-J107-2.0 through hole in cam and into hole in switch case. If index pin cannot be inserted, adjust adjusting screws as necessary to align hole in cam with hole in case.

(8) Remove index pin and install switch cover.

(9) Connect electrical connector to switch receptacle and secure with safety wire.

(10) Test flap warning system (refer to 27-4-0, Adjustment/Test - Flap Warning Horn Circuit.

FLAP PHASE VALVES - MAINTENANCE PRACTICES

1. Removal/Installation - Flap Phase Valves (see Figure 201)

A. General.

The flap phase valves are located in the hydraulic compartment on the forward bulkhead at fuselage station 964. The No. 1 hydraulic system valve is mounted inboard, the No. 2 system valve is mounted outboard.

B. Equipment Required.

(1) Suitable container for catching spilled hydraulic fluid.

C. Remove Flap Phase Valve.

(1) Check that hydraulic systems are not pressurized.

(2) Open FLAP ASYM CONT circuit breaker on main circuit breaker panel.

(3) Disconnect electrical connector from valve to be removed.

(4) Disconnect hydraulic lines from valve and drain lines in container. Wipe up any spilled hydraulic fluid.

(5) Remove two mounting bolts and remove valve.

D. Install Flap Phase Valve.

(1) Position valve on bulkhead and install two mounting bolts.

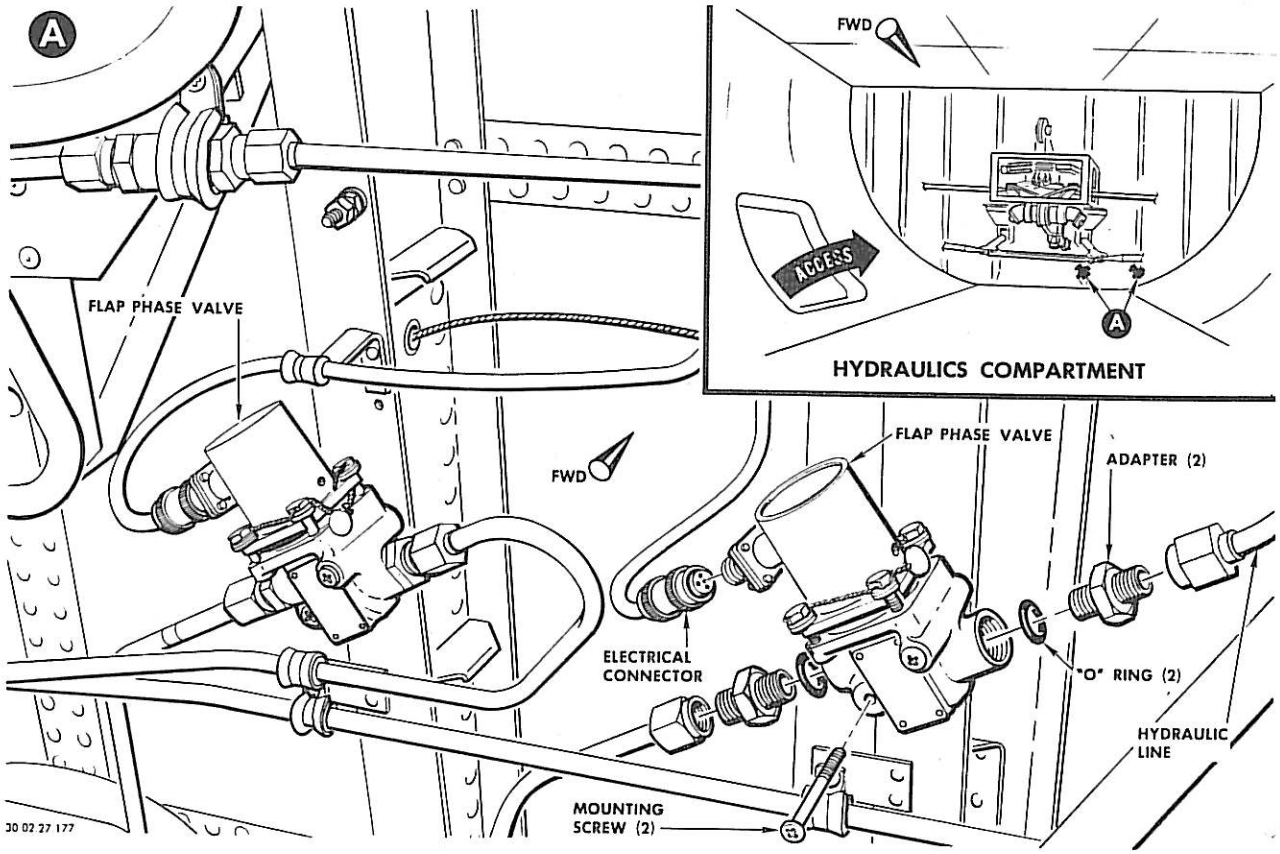
(2) Connect hydraulic lines.

(3) Install electrical connector on valve solenoid.

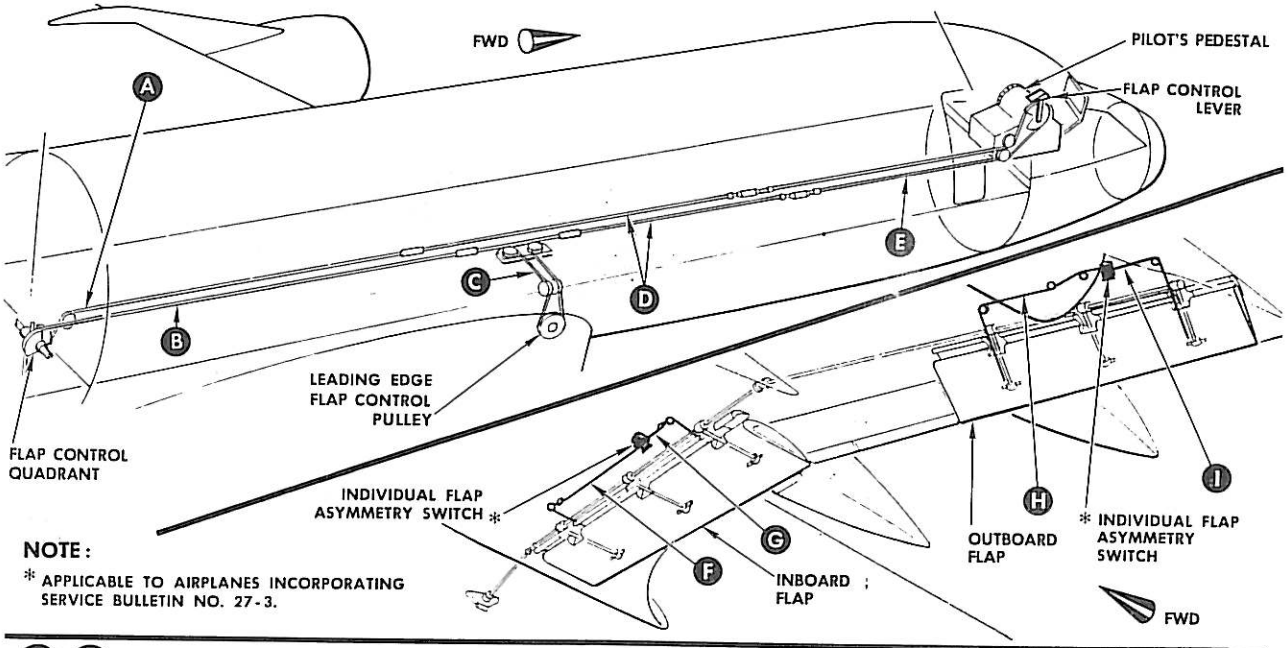
(4) Bleed flap system and perform leak test (refer to Adjustment/Test - Flap Control System Bleeding Procedure).

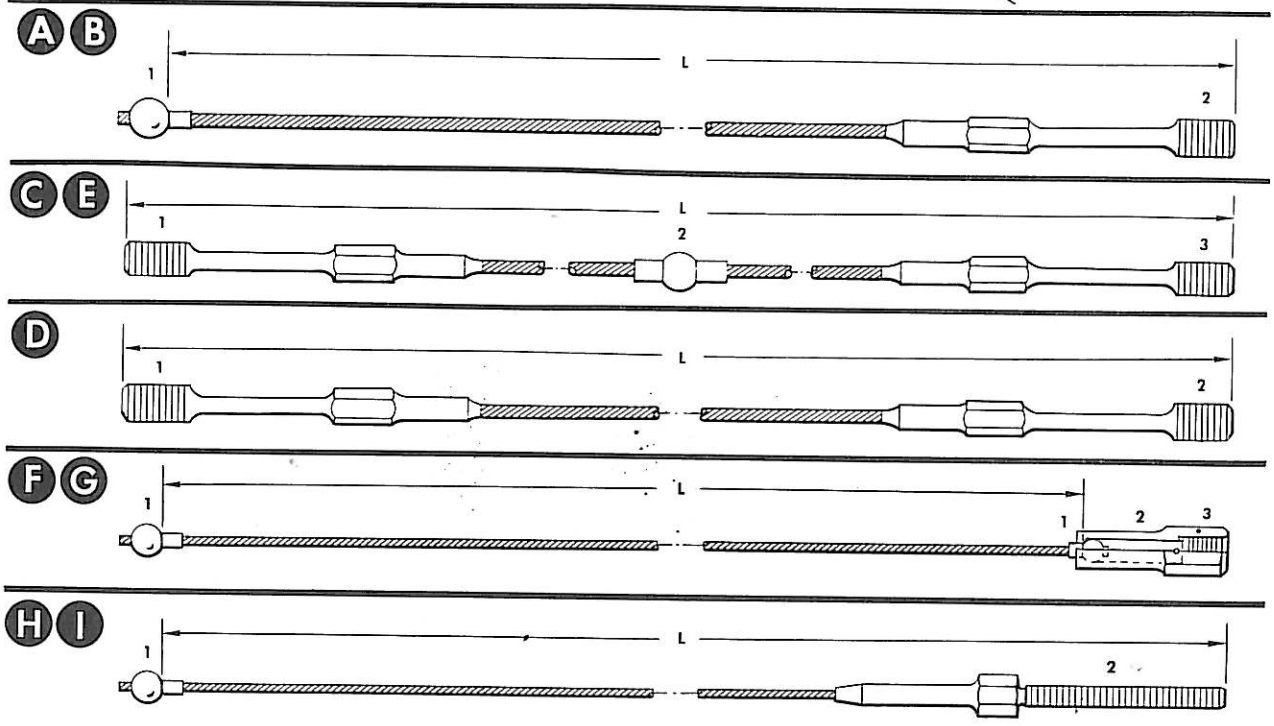
(5) Test flap system (refer to 27-4-0, Adjustment/Test - Flap Control System Functional Test).

NOTE: If a flap phase valve only has been replaced and no other rigging or adjustment has been changed, check flap operation per 27-4-0, paragraph 2.D., and steps 2.F.(4) through 2.F.(9).



Wing Flap Phase Valve Installation
Figure 201





CABLE REFERENCE	NUMBER REQUIRED	LENGTH	CABLE SIZE	FITTINGS 1	FITTINGS 2	FITTINGS 3
A	1	284.70	3/32 x 7 x 7	AN664C3	NAS650-L3LH	
B	1	303.60	3/32 x 7 x 7	AN664C3	NAS650-L3LH	
C	1	145.80	3/32 x 7 x 7	NAS650-L3LH	AN 663C3	NAS650-L3RH
D	2	184.40	3/32 x 7 x 7	NAS650-L3LH	NAS650-L3RH	
E	1	538.40	3/32 x 7 x 7	NAS650-L3RH	AN663C3	NAS650-L3RH
F	2	142.12	1/16 x 7 x 7	AN664C2	30-44512-7	NAS1222-D3
G	2	82.64	1/16 x 7 x 7	AN664C2	30-44512-7	NAS1222-D3
H	2	133.94	1/16 x 7 x 7	AN664C2	30-44519-7	
I	2	103.05	1/16 x 7 x 7	AN664C2	30-44519-7	

30.02.27.051 B

ELEVATOR CONTROL SYSTEM - DESCRIPTION AND OPERATION

1. General

The elevators provide longitudinal control of the airplane. They are actuated by a mechanical system of push-pull rods, bell cranks, and cables that connect the control columns in the flight compartment to flight tabs on the elevators (see Figure 1). The right and left elevator control systems are interconnected by two spring-loaded crossover tube assemblies. One crossover tube assembly is located between the "T" bell cranks just aft of the control columns; the other crossover tube assembly is located between bell cranks in the tail cone of the airplane. In the event of a jam in one of the elevator control systems, the spring-loaded crossover tubes allow the pilot on the opposite side of the airplane to maintain partial elevator control.

Two pressure boards are attached to "A" frames on the leading edge of each elevator. Air pressure, entering through tubes from the leading edges of the horizontal stabilizer, acts on the pressure boards to produce a moment about the elevator hinge and increase the effectiveness of the flight tabs.

Three hydraulic flutter dampers are mounted on each elevator at the hinge line to guard against elevator surface flutter. Two additional hydraulic flutter dampers, mounted in the trailing edge area of the stabilizer, are connected to the flight tab bell crank of each elevator to guard against flight tab flutter.

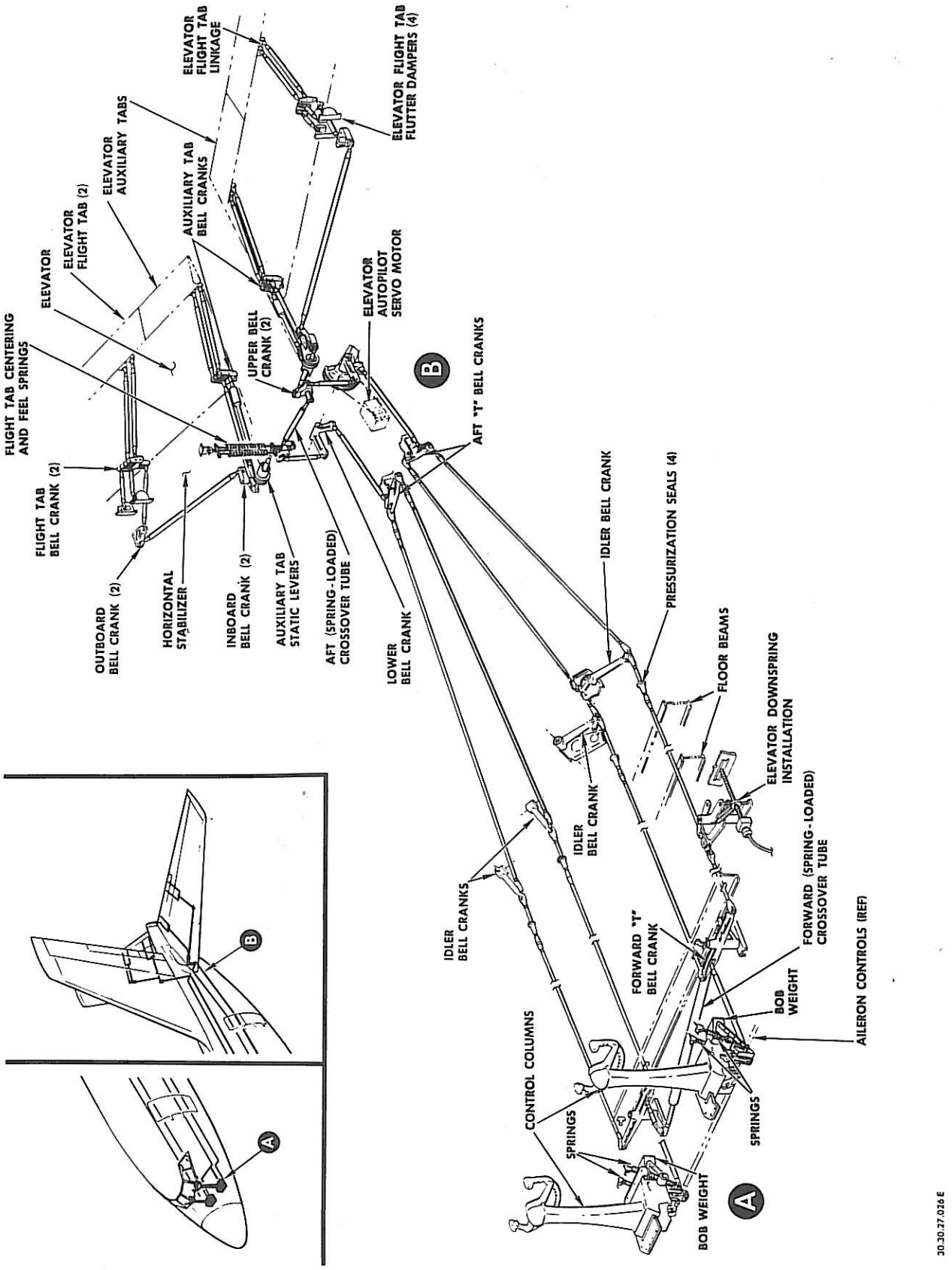
The position of the elevators during flight is controlled by flight tabs. Aerodynamic forces acting on the flight tabs when they are deflected in either direction move the elevators in the opposite direction. Rearward motion of either control column moves the flight tabs down and the elevators are forced upward.

The flight tab control rods in each elevator crossoover from the upper arm of the flight tab bell crank to the flight tab horns mounted beneath the hinge line of the flight tabs. With this arrangement, any deflection of the elevators, independent of the control columns, causes the flight tabs to anti-servo, (deflect in the same direction as that in which the elevators are moved).

During flight, the flight tabs are intentionally moved up or down by moving the control column back or forth. As the elevators move away from neutral, the anti-servo action of the elevator control linkage decreases the deflection of the flight tabs until the deflecting force of the flight tabs is balanced by the aerodynamic forces tending to streamline the elevators.

An elevator auxiliary tab mounted inboard of the flight tab on each elevator is connected to static levers on the stabilizer pivot shaft. When the stabilizer leading edge is lowered, the auxiliary tabs are deflected downward to provide additional "nose up" trim.

An elevator downspring is connected to the flight tab "up" control cable. The downspring provides an approximately constant "forward" force on the



Elevator Control System
Figure 1

TEMPORARY REVISION NO. 27-98

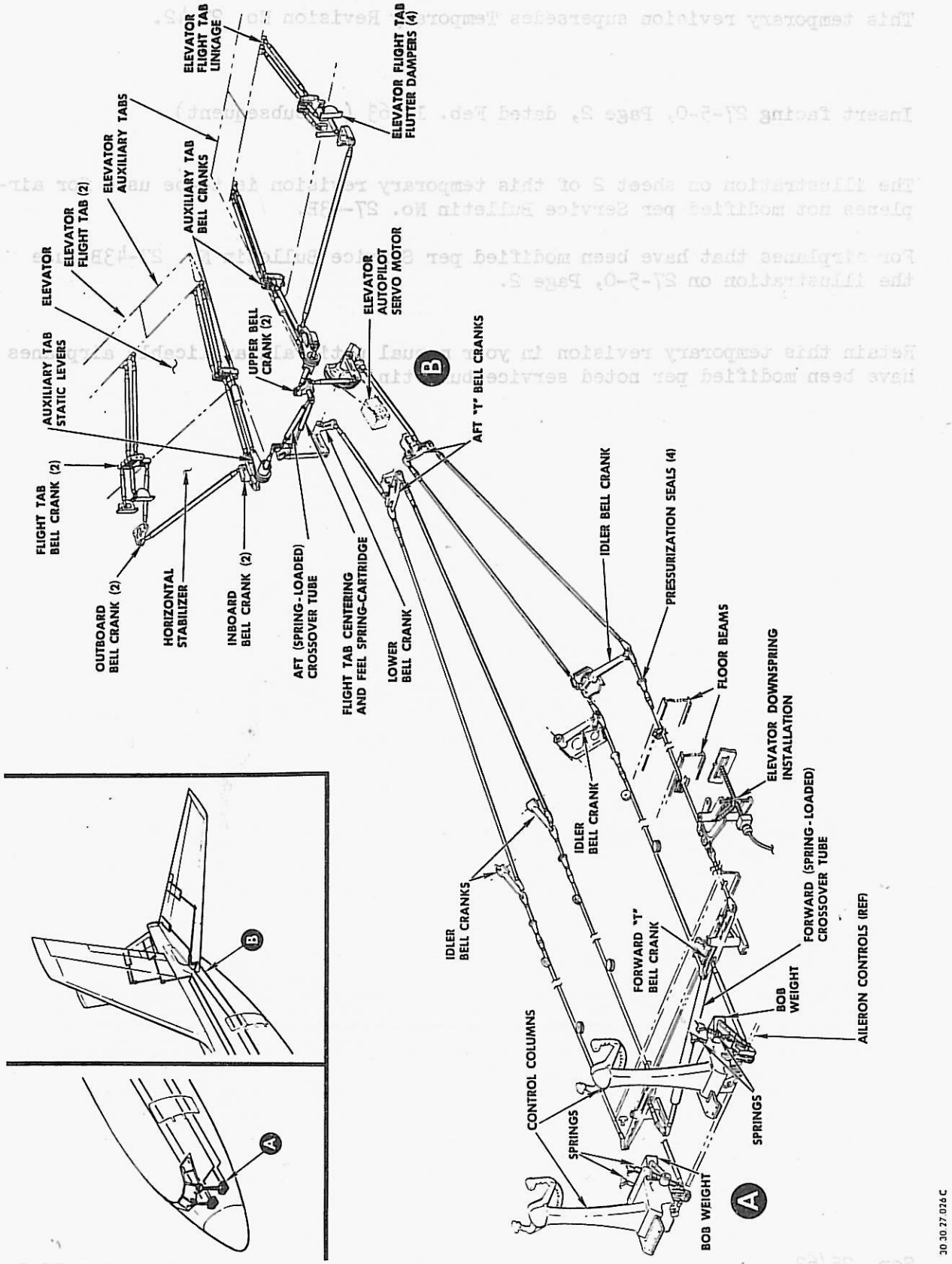
This temporary revision supersedes Temporary Revision No. 27-42.

Insert facing 27-5-0, Page 2, dated Feb. 15/63 (or subsequent).

The illustration on sheet 2 of this temporary revision is to be used for airplanes not modified per Service Bulletin No. 27-43B.

For airplanes that have been modified per Service Bulletin No. 27-43B, use the illustration on 27-5-0, Page 2.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.


ELEVATOR FLIGHT TAB LINKAGE
ELEVATOR FLIGHT TAB FLUTTER DAMPERS (4)
ELEVATOR AUXILIARY TABS
AUXILIARY TAB BELL CRANKS
ELEVATOR FLIGHT TAB (2)
ELEVATOR
ELEVATOR AUTOPILOT SERVO MOTOR
UPPER BELL CRANK (2)
AUXILIARY TAB STATIC LEVERS
FLIGHT TAB BELL CRANK (2)
AFT "T" BELL CRANKS
IDLER BELL CRANK
PRESSURIZATION SEALS (4)
FLOOR BEAMS
OUTBOARD BELL CRANK (2)
HORIZONTAL STABILIZER
INBOARD BELL CRANK (2)
AFT (SPRING-LOADED) CROSSOVER TUBE
FLIGHT TAB CENTERING AND FEEL SPRING-CARTRIDGE
LOWER BELL CRANK
ELEVATOR DOWNSPRING INSTALLATION
IDLER BELL CRANK
IDLER BELL CRANKS
FORWARD (SPRING-LOADED) CROSSOVER TUBE
FORWARD "T" BELL CRANK
BOB WEIGHT
AILERON CONTROLS (REF)
CONTROL COLUMNS
SPRINGS
SPRINGS
BOB WEIGHT
B
A
30 30 27 026 C

control column when the flaps are at zero degrees. The assembly is interconnected by a flexible drive shaft to the flap central drive gearbox so that the downspring force varies approximately linearly to zero as the flaps extend to "full down" position.

2. Elevator, Elevator Flight Tab, and Elevator Auxiliary Tab Travel

Elevator travel limits are 25 degrees "up" and 12 degrees "down" from the streamline position. The travel is limited by the elevator stop in each horizontal stabilizer.

Flight tab travel limits are 12 degrees "up" and 25 degrees "down" from the streamline position. Flight tab deflection is limited by flight tab stops which limit rotation of the flight tab bell cranks. Further movement of the controls will move the elevators.

The elevator auxiliary tab travel is from 4 to 25 degrees in the trailing edge down direction only. Auxiliary tab position is determined directly by the horizontal stabilizer trim setting.

3. Elevator Control and Operation

Longitudinal control of the airplane is accomplished in flight by moving either control column forward or aft. Fore and aft movement of the control columns, hinged below the pilots' floor, is transmitted through push-pull tubes which extend aft to a forward "T" bell crank on each side of the fuselage. The forward spring-loaded crossover tube interconnects the "T" bell cranks, providing simultaneous movement of the control columns.

Dual nonflex cables attached to each "T" bell crank extend aft under the floor in the passenger cabin to four idler bell cranks in the unpressurized area behind the aft pressure bulkhead. The elevator downspring assembly is attached to a link in the left-hand outboard flight tab control cable at approximately station 995. From the idler bell cranks, the cable system is routed upward in line with the tapered contour of the fuselage tail section where each pair of cables is attached to an aft "T" bell crank (see Figure 1).

Two control rods attached to the aft "T" bell cranks extend aft to two lower bell cranks. The autopilot servo system is connected to the elevator system by a servo control cable quadrant attached to the left-hand lower bell crank. Vertical control rods extend upward to a pair of upper bell cranks interconnected by the aft spring-loaded crossover tube. The right-hand upper bell crank is connected to the flight tab centering and feel spring. A single rod extends outboard from each of these bell cranks through the stabilizer pivot shaft to an inboard bell crank. Another rod extends outboard to an outboard bell crank in line with the flight tab linkage to the elevator. From here, a single control rod extends aft to a flight tab bell crank attached to dual push-pull rods extending aft to the flight tab horns.

The elevator auxiliary tab is linked directly to the horizontal stabilizer pivot shaft. A shear-fail control rod and a spring-cartridge control rod connect the static levers on the stabilizer pivot shaft to the auxiliary tab bell crank at the elevator hinge line. Dual push-pull control rods connect the bell crank to the auxiliary tab.

4. Elevators

The elevators are the pressure board type and are provided with flight tabs and auxiliary tabs (see Figure 2). Except for the spring-loaded crossover tubes in the elevator control linkage, there is no interconnect between the left and right elevator systems. Six hinge points, are provided for the attachment of each elevator. The pressure boards are hinged to the elevator leading edge. Refer to Chapter 55, STABILIZERS, for a description of the elevator structure.

5. Elevator Flight Tabs and Auxiliary Tabs

The elevator flight tabs and the auxiliary tabs are of solid sandwich construction with 0.016-inch, 2024 aluminum alloy skins and 5052 honeycomb core. An 0.032-inch, 7075 channel serves as a spar. An 0.032-inch, 2024 doubler is added along the spar and extends aft in the area of the hinge fittings. Four hinge fittings attach each flight tab to the elevator and three hinge fittings are used to attach each auxiliary tab to the elevator.

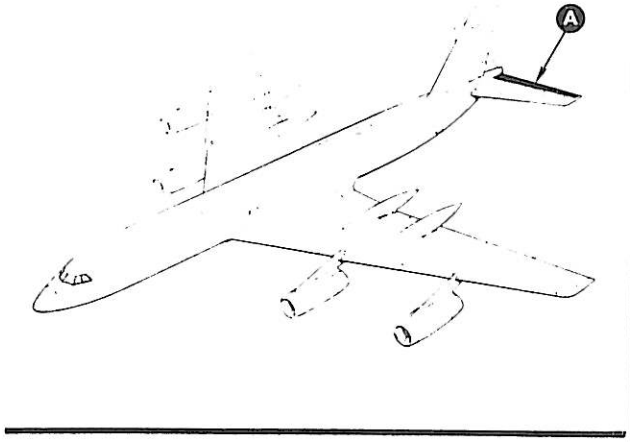
6. Spring-Loaded Crossover Tube Assemblies (Forward and Aft)

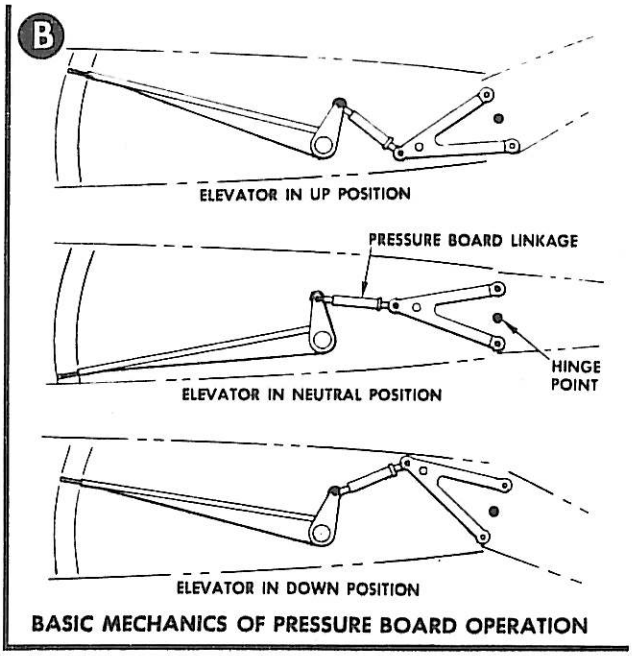
The forward spring-loaded crossover tube connects the forward "T" bell cranks, and through them interconnects the two control columns (see Figure 1). The aft spring-loaded crossover tube connects the elevator linkages as they extend outboard into the stabilizer. A preloaded spring in each spring-loaded crossover tube causes the tube to act as a rigid link for transmitting the low forces required for normal flight. In the event that either elevator control system becomes jammed, the other elevator can be operated by overriding the spring-loaded crossover tube assemblies with the control column of the operative elevator control system.

With the LH elevator and flight tab secured in the streamlined position, the force necessary to move the RH control column is 91 pounds. The force required to move the RH elevator to the full up position is 170 pounds. A force of 129 pounds is required to move the RH elevator to the full down position. With the RH elevator and flight tab secured in the streamlined position, the breakout and full deflection forces are 128, 171 and 152 pounds respectively.

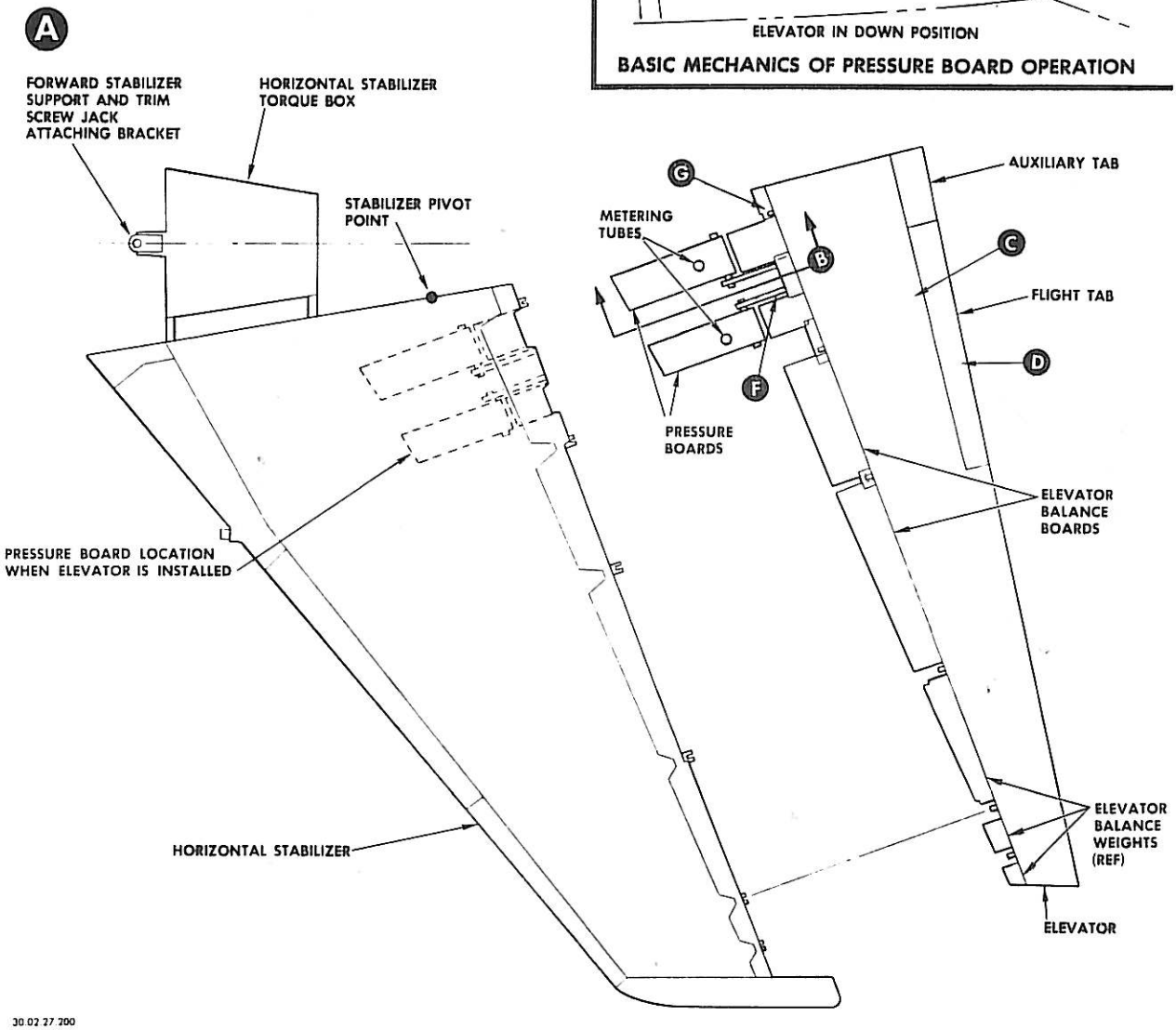
7. Elevator Pressure Boards

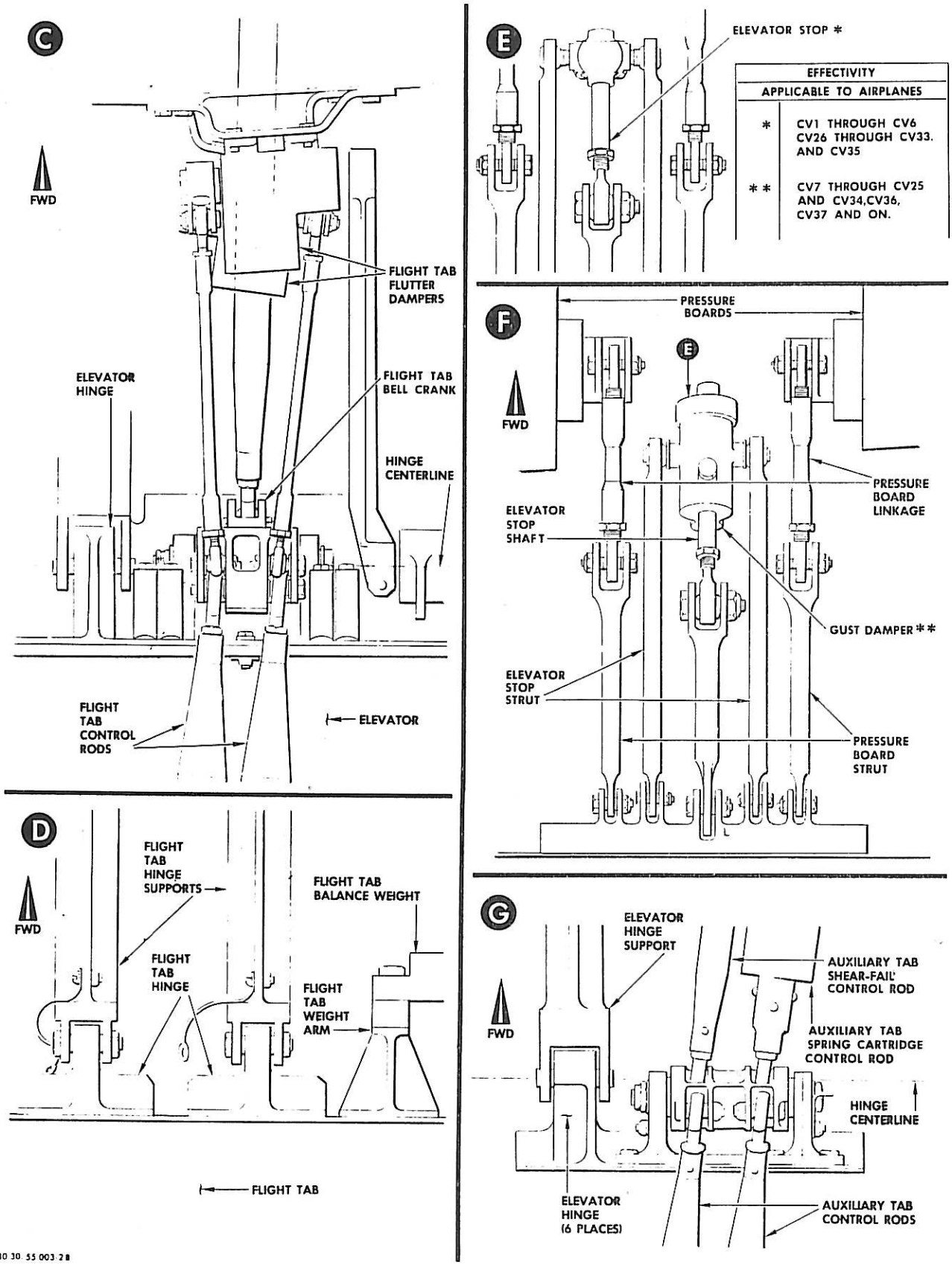
Two pressure boards are located forward of each elevator in pressure boxes in the trailing edge of the stabilizer. The aft edge of each pressure board is connected to the leading edge of the elevator. Through linkage attached to an "A" frame on the front spar of the elevator and a lever on the pressure board, the pressure board always moves in the same direction when the elevator is deflected. Air pressure is directed through ducts





BASIC MECHANICS OF PRESSURE BOARD OPERATION





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from intakes in the horizontal stabilizer leading edge to the lower surface of the board. When the elevator is in neutral, pressure on each side of the pressure boards is equalized through a pressure metering tube. Deflection of the elevator moves the pressure boards, closing off the metering tube, and allowing the air pressure on the boards to produce increased force to aid in operation of the elevator surface. Curtains attached to the edges of the pressure board and sides of the pressure board compartments prevent air flow from one side of the board to the other.

8. Elevator Downspring Installation

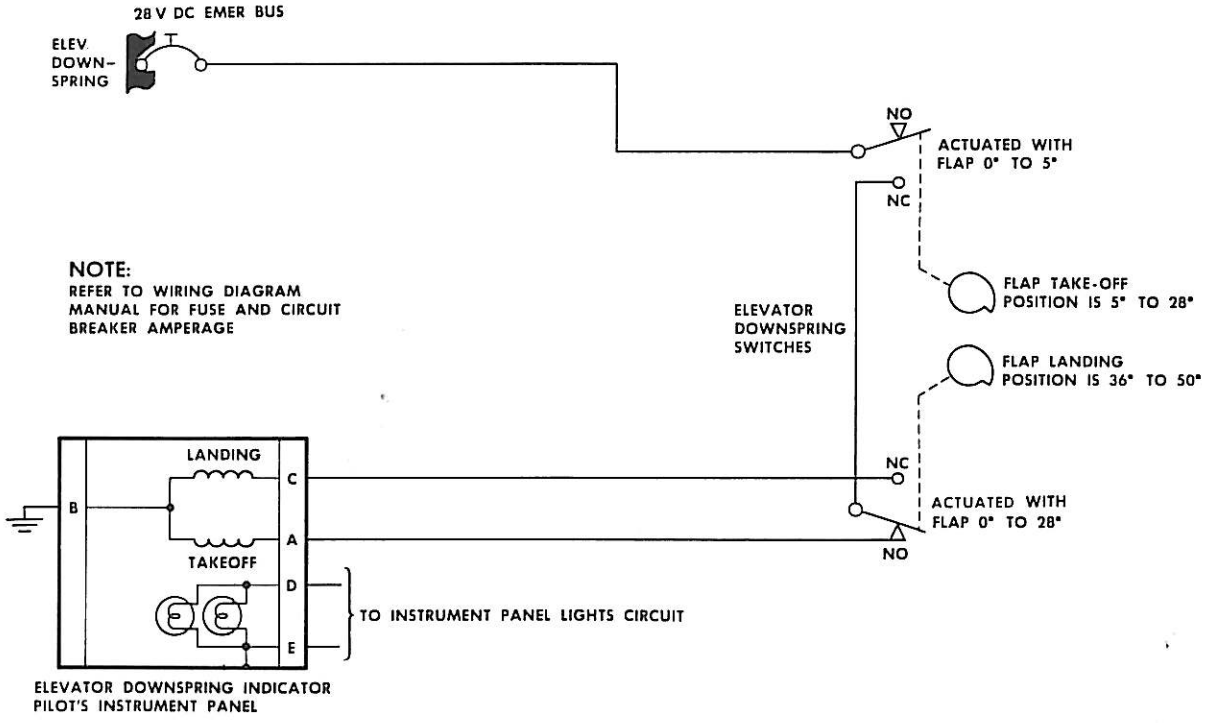
The elevator downspring installation is linked to the left-hand outboard flight tab control cable at station 995 (see Figure 1). The installation consists of a threaded drive screw connected by a flexible shaft to the flap central drive gear box, a spring beam actuated by the drive screw, two springs, and a lever attached to a link in the flight tab control cable. Retracting the flaps rotates the flexible shaft which turns the threaded drive screw through a drive nut in the spring beam. Movement of the spring beam changes the angle between the spring beam and the lever. As the flaps retract, and the angle of the spring beam in relation to the lever becomes larger, the springs exert more force on the flight tab control cable in a forward direction (causing a forward bias of the control column from neutral and a flight tab trailing edge up condition). With the flaps in the retracted position, the springs exert the greatest amount of force on the flight tab control cable. Extension of the flaps decreases the force applied by the spring to a point where the centering and feel spring streamlines the flight tabs and returns the control column to neutral.

9. Elevator Downspring Position Indicator System (see Figure 3)

The elevator downspring position indicator system consists of two microswitches actuated by a cam plate on the elevator downspring lower spring beam and an indicator on the pilots' instrument panel. Since flap movement controls the elevator downspring position, the downspring indicator reading is related to the flap position. The indicator shows the elevator downspring to be in cruise position when the flaps are fully retracted. When the flaps are at 10 or 27 degrees the indicator shows the downspring to be in takeoff position. At 36 or 50 degrees of flap deflection, a downspring "landing condition" is indicated.

*A third switch is also mounted on the elevator downspring and is actuated by the switch cam plate at 24 degree wing flap position. This switch is used in the monitor circuit of the autopilot elevator servo dual torque switching.

*Applicable to Group II airplanes CV1 through CV25 and CV35 through CV37; also applicable to airplanes CV26 through CV34 after incorporation of Service Bulletin No. 27-48. For group designations refer to Manual INTRODUCTION.



Elevator Downspring Position Indicator Schematic
Figure 3

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 27-76.

This temporary revision supersedes Temporary Revision No. 27-43.

Insert facing 27-5-0, Page 9, dated Feb. 15/63 (or subsequent).

The instructions in this temporary revision are to be used for airplanes not modified per Service Bulletin No. 27-43B.

For airplanes that have been modified per Service Bulletin No. 27-43B use the instructions on 27-5-0, Page 9.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

Delete paragraph 10 and replace with the following:

A simple centering and feel mechanism is connected to the elevator RH upper bell crank. (See Figure 1). The centering and feel spring is located in the unpressurized area of the fuselage aft of the stabilizer.

10. Flight Tab Centering and Feel Spring

An extension type centering and feel spring is installed between the elevator RH upper bell crank and the airplane structure (see Figure 1). The centering and feel spring is located in the unpressurized area of the fuselage aft of the horizontal stabilizer.

11. Autopilot Elevator Servo

The autopilot elevator servo is mounted to fuselage structure between the control rods that connect the elevator aft "T" and lower bell cranks in the tail cone section of the airplane. The autopilot servo drives the elevator control linkage through cables connected to a servo quadrant on the left elevator upper bell crank. For a complete description of the autopilot system, refer to Chapter 22, AUTOPILOT.

12. Elevator Stops (*Gust Dampers or **Elevator Stops)

A. Elevator Gust Dampers.

The elevator gust dampers, one for each elevator, protect the elevators from damage due to high winds when the airplane is on the ground. They resist any rapid movement of the elevators and serve as stops to limit elevator travel. The gust dampers are mounted in the horizontal stabilizer and are connected to the inboard end of each elevator through an "A" frame which extends well forward of the elevator hinge line.

B. Elevator Stops.

One elevator stop on each elevator limits the travel of the elevators. The elevator stop (see Figure 2) consists of an elevator stop shaft, trunnion and rod end fitting. The elevator stop is interchangeable with the elevator gust damper and the mounting is similar.

13. Elevator Flutter Dampers

A. Description.

The elevators are protected against any flutter tendency by six hydraulic flutter dampers, one located at the inboard end, two at the outboard end of each elevator. The flutter dampers are mounted on the front spars of the elevators in line with the elevator hinge line. Each flutter damper consists essentially of a hollow cylinder, a hollow shaft with a protruding splined end, a damper arm with a serrated opening that fits over the splined end of the shaft, a reservoir for a reserve supply of hydraulic fluid, and a spring-loaded piston located in one end of the reservoir. The space between the cylinder wall and the outside of the hollow shaft is divided into six separate chambers by three

*Applicable to airplanes CV1 through CV6, CV26 through CV33, and CV35.
**Applicable to airplanes CV7 through CV25, CV34, CV36, CV37 and on.

stators integral with the cylinder and three vanes attached to the shaft. Each of these chambers is connected to the cavity in the center of the shaft by a metering passage. The damper arm is attached to the horizontal stabilizer structure to keep the damper shaft from rotating when the elevators are deflected. The spring-loaded piston forces hydraulic fluid from the reservoir into the center of the shaft as needed. Each flutter damper unit is provided with a fluid level indicator and a filler valve for servicing.

B. Operation.

When the elevators are deflected in either direction, the flutter damper cylinders are rotated about the flutter damper shafts. As the cylinder stators move in relation to the shaft vanes, the chambers ahead of the stators are decreased in size and hydraulic fluid is forced through the metering passages into the center of the shaft. Simultaneously hydraulic fluid flows from the center of the shaft through the remaining metering passages into the enlarging chambers behind the stators.

The rate at which the elevators can be deflected is governed by the size of the metering passages. These passages are large enough to permit normal operating movements of the elevators and yet small enough to dampen any sudden movement such as would occur if a flutter tendency should develop.

14. Flight Tab Flutter Dampers

Each elevator flight tab is protected against flutter tendency by two rotary hydraulic flutter dampers mounted on brackets attached to the stabilizer structure at the aft inboard section of each horizontal stabilizer. The flutter dampers are connected to arms on the elevator flight tab bell cranks by short adjustable push-pull rods. The flight tab flutter dampers operate on the same principle as the elevator surface flutter dampers previously described.

15. Control Columns

The pilot's and copilot's control columns are interconnected by a spring-loaded crossover tube and move simultaneously. Fore and aft movement of the control columns actuates the elevators and raises and lowers the nose of the airplane. Turning the control wheels actuates the ailerons and spoilers to provide lateral control. Stops limit control column travel and control wheel rotation.

An autopilot disengage button, a microphone button, and a stabilizer trim switch are located on the outboard horn of each control wheel. A storm light button is mounted on the inboard horn of each control wheel.

ELEVATOR CONTROL SYSTEM - TROUBLE SHOOTING

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
1. EXCESSIVE FORCE REQUIRED TO MOVE ELEVATOR FLIGHT TABS	
A. Elevator flight tab hinges dry.	Lubricate elevator hinges (refer to Chapter 12, SERVICING). If controls still stiff, trouble is elsewhere.
B. Control cables too tight.	Check tension of elevator control cables. If tension is not 205 (±25.0) pounds at 70 degrees F (21 degrees C) adjust cables to proper tension (refer to Adjustment/Test Elevator Control System Functional Test). If tension is within tolerance, trouble is elsewhere.
C. Excessive friction in elevator control column or elevator control bell cranks.	Disconnect inboard ends of control rods passing through stabilizer pivots from elevator control upper bell cranks and move control columns back and forth. If control columns do not move freely, disconnect forward ends of control rods from elevator control column arms and move control columns back and forth. If one of the control columns does not move freely, dismantle control column supports and replace faulty unit as indicated. If both control columns move freely, disconnect control rods and loosen control cables to isolate faulty bell crank. Replace faulty unit as indicated. If control columns move freely when they are connected to the elevator control system, the trouble is in one of the flight tab control systems. Isolate faulty system by checking each flight tab for free movement. Disconnect control rod and flutter damper push-pull rods from flight tab bell crank. Check flutter dampers and flight tab and elevator control outboard bell cranks for free movement; replace faulty unit as indicated.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
1. EXCESSIVE FORCE REQUIRED TO MOVE ELEVATOR FLIGHT TABS (CONT)	
D. Elevator downspring not properly lubricated.	Lubricate elevator downspring (refer to Chapter 12, SERVICING).
E. Elevator downspring not properly adjusted.	Check adjustment of elevator downspring and adjust as necessary.
2. ELEVATOR CONTROL SYSTEM JAMMED	
A. Interference from foreign objects.	Disconnect inboard ends of elevator control rods passing through stabilizer pivot from elevator control upper bell cranks and actuate elevator control columns. If system still jammed, check cable bell cranks and control column assemblies for foreign objects. If interfering object not found, isolate trouble spot by disconnecting control rods and relieving tension in cable system and testing individual bell cranks for free movement. Free jammed unit and replace unit if damaged. If control columns are free after control rods were disconnected from elevator control upper bell crank, isolate trouble spot by disconnecting control rods and testing individual units. Remove foreign object when found and replace unit if damaged. WARNING: ANY UNITS DISCONNECTED OR CONNECTIONS BROKEN DURING TROUBLE SHOOTING MUST BE CONNECTED AND THE SYSTEM TESTED BEFORE THE AIRPLANE IS RETURNED TO SERVICE (refer to 27-5-0, Adjustment/Test).

1. Adjustment/Test Elevator Control System Rigging and Adjustment (See Figure 201)

A. Elevator and Elevator Flight Tab Travel Data (see Figure 202).

(1) General.

Angular measurements are taken with a protractor installed on the trailing edge of the control surface or the flight tab. A linear measurement is the straight line distance, in inches, between the noted point on the surface in the streamline position and the same point on the surface in the deflected position.

B. Equipment Required.

(1) Tools 30-00003-903 and -904 RGTL #1 for locking elevators in streamline with horizontal stabilizer (see Figure 203).

(2) Protractors 30-00003-901 and -902 RGTL #1 for measuring elevator travel.

(3) Protractors 30-00003-901 RGTL #2 for measuring flight and auxiliary tab travel.

(4) One 18-inch scale for measuring control column travel.

(5) Standard cable tensiometer for measuring tension of 3/32-inch 7 x 7 cables.

(6) Specially calibrated tensiometer for measuring tension of 1/8-inch 1 x 19 cables.

(7) Index pins 22-J107-1.75, -2.0, -3.25, and -6.0.

(8) Thermometer.

(9) External source of hydraulic power (for use only if flaps are not in full-down position).

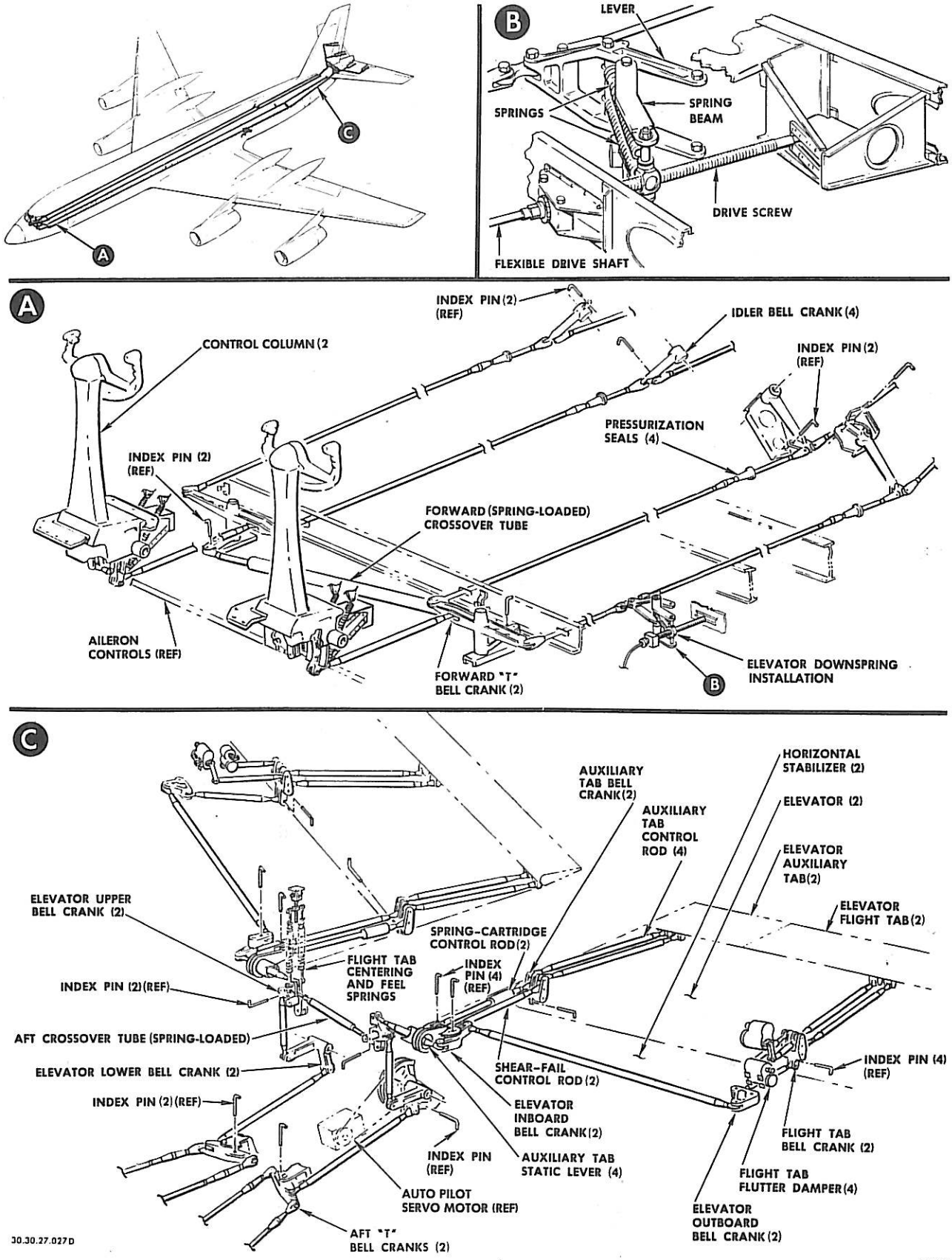
C. Adjust Elevator Cable System.

(1) Check that stabilizer is positioned at 0 (±0.50) degrees. If not, adjust stabilizer to correct setting using emergency trim crank in left aft lavatory.

NOTE: A reference hole in the leading edge of the LH stabilizer and two brazier head rivets in the fuselage skin are aligned when the horizontal stabilizer is in the 0-degree position.

(2) Disconnect two control rods that extend forward from forward "T" bell cranks beneath floor of pilots' compartment.

(3) Disconnect one end of spring-loaded crossover tube from forward "T" bell crank.


A
B
C
LEVER
SPRINGS
SPRING BEAM
DRIVE SCREW
FLEXIBLE DRIVE SHAFT
INDEX PIN (2) (REF)
IDLER BELL CRANK (4)
CONTROL COLUMN (2
INDEX PIN (2) (REF)
PRESSURIZATION SEALS (4)
INDEX PIN (2) (REF)
FORWARD (SPRING-LOADED) CROSSOVER TUBE
AILERON CONTROLS (REF)
FORWARD "T" BELL CRANK (2)
ELEVATOR DOWNSPRING INSTALLATION
AUXILIARY TAB BELL CRANK (2)
HORIZONTAL STABILIZER (2)
AUXILIARY TAB CONTROL ROD (4)
ELEVATOR (2)
ELEVATOR AUXILIARY TAB (2)
ELEVATOR UPPER BELL CRANK (2)
ELEVATOR FLIGHT TAB (2)
SPRING-CARTRIDGE CONTROL ROD (2)
FLIGHT TAB CENTERING AND FEEL SPRINGS
INDEX PIN (4) (REF)
INDEX PIN (2) (REF)
AFT CROSSOVER TUBE (SPRING-LOADED)
ELEVATOR LOWER BELL CRANK (2)
SHEAR-FAIL CONTROL ROD (2)
INDEX PIN (4) (REF)
INDEX PIN (2) (REF)
ELEVATOR INBOARD BELL CRANK (2)
FLIGHT TAB BELL CRANK (2)
INDEX PIN (REF)
AUXILIARY TAB STATIC LEVER (4)
FLIGHT TAB FLUTTER DAMPER (4)
AUTO PILOT SERVO MOTOR (REF)
ELEVATOR OUTBOARD BELL CRANK (2)
AFT "T" BELL CRANKS (2)
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TEMPORARY REVISION NO. 27-44.

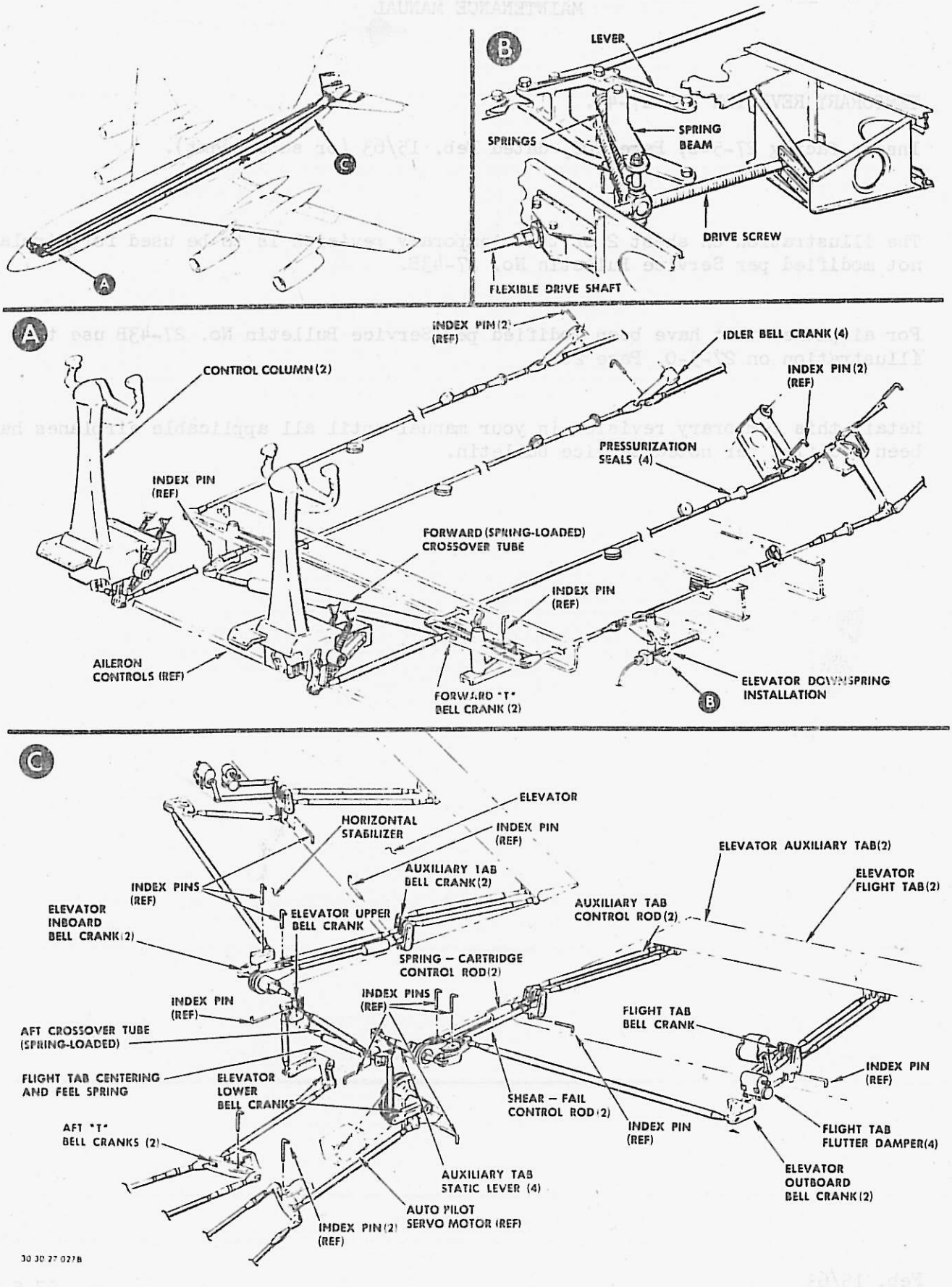
Insert facing 27-5-0, Page 202, dated Feb. 15/63 (or subsequent).

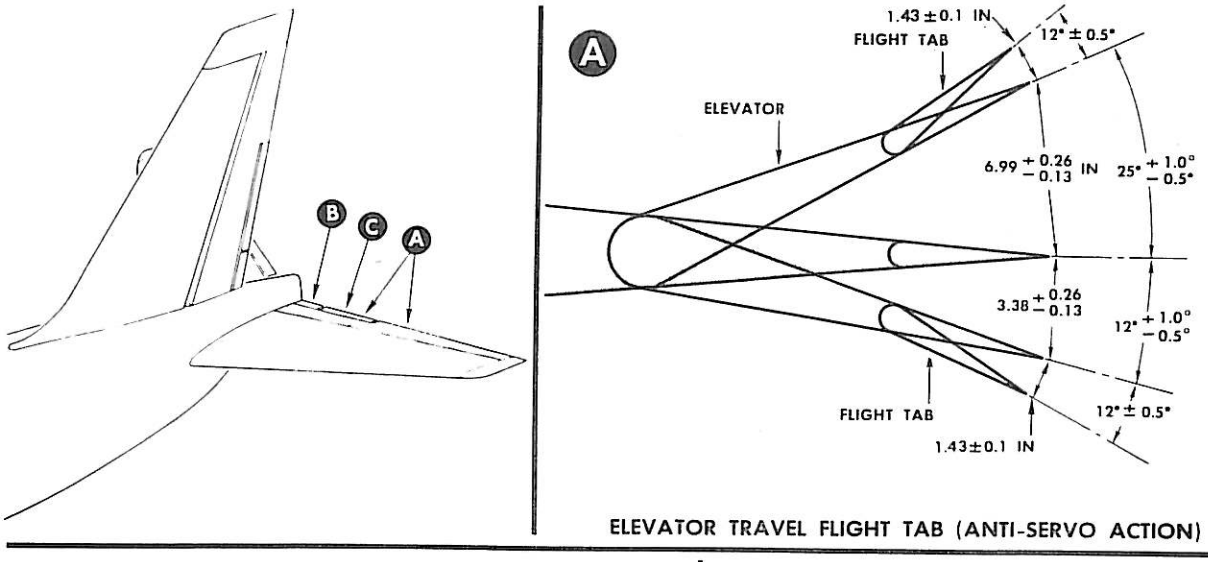
The illustration on sheet 2 of this temporary revision is to be used for airplanes not modified per Service Bulletin No. 27-43B.

For airplanes that have been modified per Service Bulletin No. 27-43B use the illustration on 27-5-0, Page 202.

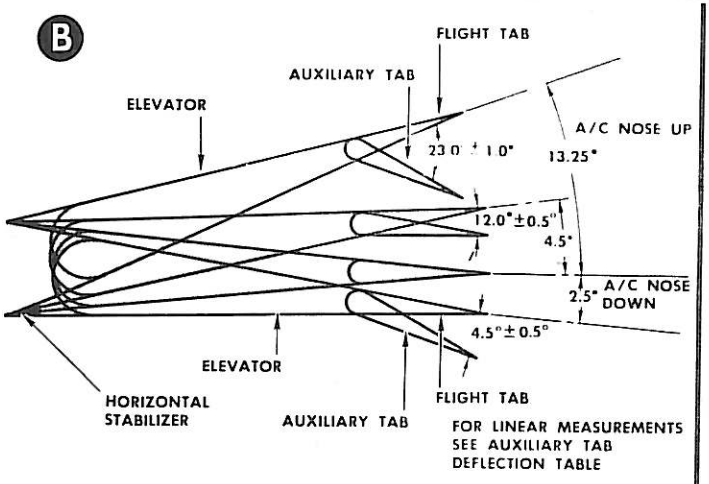
Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

TEMPORARY REVISION NO. 27-44.

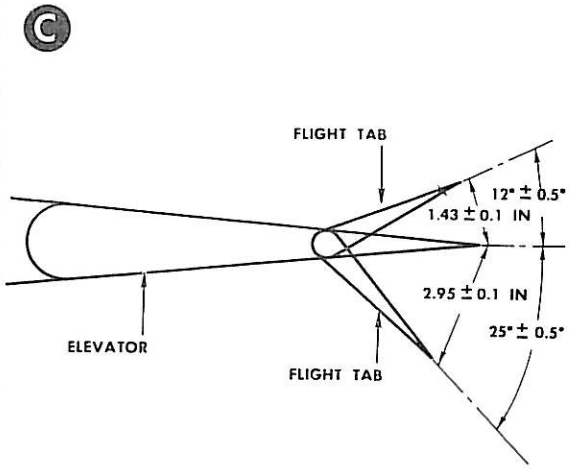




ELEVATOR TRAVEL FLIGHT TAB (ANTI-SERVO ACTION)



AUXILIARY TAB TRAVEL



FLIGHT TAB TRAVEL

	ANGULAR DEFLECTION		LINEAR DEFLECTION		LOCATION OF POINT ON SURFACE FOR DETERMINING LINEAR MEASUREMENTS
	UP	DOWN	UP	DOWN	
ELEVATOR	25° + 1.0° − 0.5°	12° + 1.0° − 0.5°	6.99 + 0.26 − 0.13 INCH	3.38 + 0.26 − 0.13 INCH	SEE NOTE 1
ELEVATOR FLIGHT TAB	12° ± 0.5°	25° ± 0.5°	1.43 ± 0.1 INCH	2.95 ± 0.1 INCH	SEE NOTE 2
ELEVATOR FLIGHT TAB (ANTI-SERVO ACTION)	12° ± 0.5°	12° ± 0.5°	1.43 ± 0.1 INCH	1.43 ± 0.1 INCH	SEE NOTE 3

ELEVATOR AUXILIARY TAB DEFLECTION TABLE		
STABILIZER POSITION	TAB ANGULAR DEFLECTION	TAB LINEAR DEFLECTION
2.5° A/C NOSE DOWN	4.5° ± 0.5° DOWN	0.71 ± 0.13 INCH
4.5° A/C NOSE UP	12.0° ± 0.5° DOWN	1.90 ± 0.13 INCH
13.25° A/C NOSE UP	23.0° ± 1.0° DOWN	3.62 ± 0.26 INCH SEE NOTE 4

NOTE:
MISMATCH BETWEEN AUXILIARY TABS MUST NOT EXCEED 0.5° AT ANY STABILIZER POSITION

NOTES:
1. ELEVATOR – LINEAR MEASUREMENT IS TAKEN FROM A CENTER POINT ON ELEVATOR OUTBOARD TRAILING EDGE TO A CENTER POINT ON HORIZONTAL STABILIZER TRAILING EDGE.
2. ELEVATOR FLIGHT TAB – LINEAR MEASUREMENT IS TAKEN FROM A CENTER POINT ON FLIGHT TAB OUTBOARD TRAILING EDGE TO A CENTER POINT ON ELEVATOR TRAILING EDGE WITH ELEVATOR STREAMLINE WITH HORIZONTAL STABILIZER.
3. ELEVATOR FLIGHT TAB (ANTI-SERVO ACTION) – LINEAR MEASUREMENT IS TAKEN FROM A CENTER POINT ON FLIGHT TAB OUTBOARD TRAILING EDGE TO A CENTER POINT ON ELEVATOR TRAILING EDGE WITH ELEVATOR IN FULL UP OR DOWN POSITION. TO CHECK ANTI-SERVO ACTION OF FLIGHT TAB, ELEVATOR MUST BE MOVED WITHOUT USE OF ELEVATOR CONTROLS.
4. ELEVATOR AUXILIARY FLIGHT TAB – LINEAR MEASUREMENT IS TAKEN FROM A CENTER POINT ON FLIGHT TAB INBOARD TRAILING EDGE TO A CENTER POINT ON AUXILIARY TAB OUTBOARD TRAILING EDGE WITH ELEVATOR AND FLIGHT TAB STREAMLINE WITH HORIZONTAL STABILIZER.

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(4) Disconnect two control rods that extend back from aft "T" bell cranks in tail cone of airplane.

(5) Insert index pins 22-J107-2.0 in forward "T" bell cranks.

(6) Secure control columns in neutral position. Determine control column neutral position by measuring distance between crack on top of control column where control column housing cover butts against housing and a point just above horizon flight director indicator on instrument panel. Distance must measure 9.70 (±0.15) inches when control column is in neutral position. Measurement must be made with no force applied to either control column.

(7) Adjust length of disconnected control rods to control column arms (in neutral position) and forward "T" bell cranks and reinstall on forward "T" bell cranks.

(8) Adjust length of forward spring-loaded crossover tube to rigged forward "T" bell cranks and install disconnected end of crossover tube on "T" bell crank.

(9) Adjust length of elevator control cables so that index pins 22-J107-3.25 can be inserted in aft "T" bell cranks and index pin 22-J107-6.0 can be inserted in bell crank in elevator downspring assembly at fuselage station 995.

(10) Remove index pins from aft "T" bell cranks and from bell crank in elevator downspring assembly.

(11) Tighten opposing elevator cables alternately and increase tension to 205 (±25) pounds at 70 degrees F (21 degrees C). Increase or decrease cable tension 1 pound for each degree F (2 pounds for each degree C) increase or decrease respectively in free air temperature.

(12) Tighten and loosen turnbuckles in opposing cables until index pins can be inserted in aft "T" and elevator downspring bell cranks.

(13) Safety all turnbuckles with NAS 651 clips and remove index pins from "T" bell cranks and downspring bell crank.

D. Adjust Elevator Control Rods in Aft Fuselage.

(1) Disconnect inboard ends of two control rods that extend from upper bell cranks through stabilizer pivot shaft.

(2) Disconnect left end of aft spring-loaded crossover tube from left upper bell crank.

(3) Disconnect upper end of centering and feel spring from bulkhead bracket.

(4) Insert index pins 22-J107-6.0 through both upper bell cranks.

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 27-45.

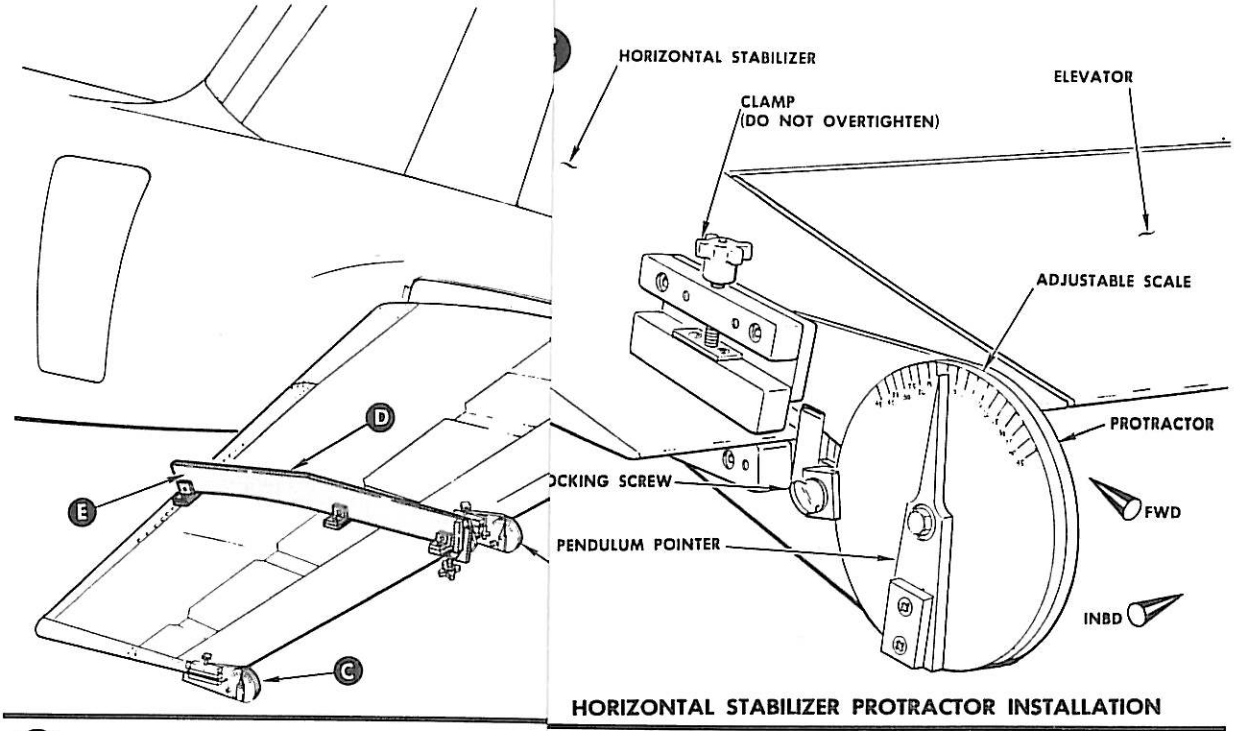
Insert facing 27-5-0, Page 204, dated Feb. 15/63 (or subsequent).

The instructions in this temporary revision are to be used for airplanes not modified per Service Bulletin No. 27-43B.

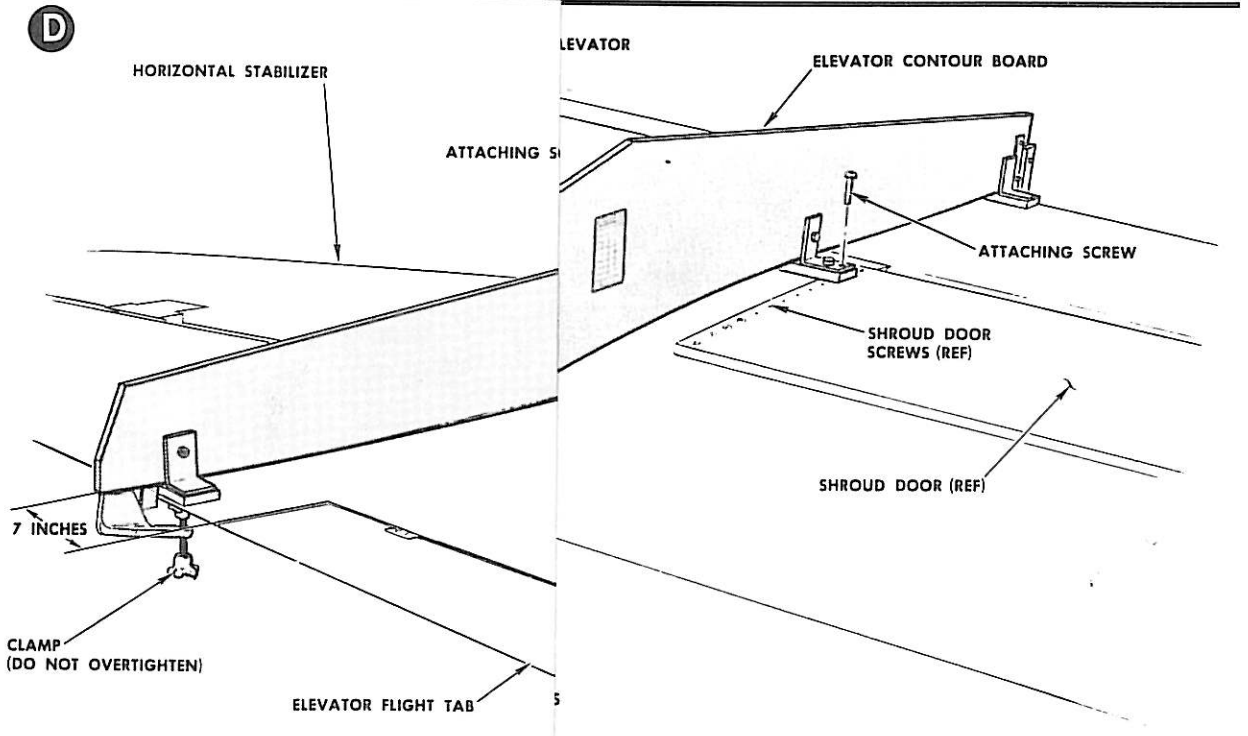
For airplanes that have been modified per Service Bulletin No. 27-43B use the instructions on 27-5-0, Page 204.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

Page 204, delete step (3) and substitute the following:
(3) Disconnect left end of centering and feel spring from beam bracket.



HORIZONTAL STABILIZER PROTRACTOR INSTALLATION



NOTE:

1. REMOVE LEADING EDGE AND SHROUD DOOR ATTACHING SCREWS AS REQUIRED.USE EXISTING SCREW HOLES TO ATTACH CONTOUR BOARD.

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CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 27-46.

Insert facing 27-5-0, Page 207, dated Feb. 15/63 (or subsequent).

The instructions in this temporary revision are to be used for airplanes not modified per Service Bulletin No. 27-43B.

For airplanes that have been modified per Service Bulletin No. 27-43B use the instructions on 27-5-0, Page 207.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

Page 207, delete step D.(6) and substitute the following:

(6) Adjust length of centering and feel spring to distance between rigged bell crank and bracket. Install free end on beam bracket, tighten lock nut, and secure with tab washer.

(5) Adjust length of aft spring-loaded crossover tube to rigged bell cranks. Install left end of crossover tube on left upper bell crank, tighten lock nut, and secure with tab washer.

(6) Install free end of spring assembly on bulkhead bracket and tighten lock nut on clevis. Adjust length of individual springs to a distance of 17.40 inches between centers of spring attach bolt holes.

(7) Adjust length of control rods previously disconnected from aft "T" bell cranks until bolt will pass through rod ends and aft "T" bell cranks. Install control rods on aft "T" bell cranks.

(8) Remove index pins from aft "T" bell cranks.

E. Adjust Elevator Control Rods in Stabilizer.

(1) Disconnect control rods from horns of both flight tabs.

(2) Set horizontal stabilizer at 0 (±0.50) degrees (refer to paragraph C).

(3) Install tools 30-00003-903 and -904, RGTL #1 to secure elevators in streamline position (see Figure 203).

(4) Install protractor 30-00003-901, RGTL #2 and maintain flight tabs in position streamline with elevators.

(5) Remove elevator inboard bell crank access panels from underside of horizontal stabilizer and insert index pin 22-J107-3.25 through each inboard bell crank.

(6) Adjust length of control rods disconnected from upper bell cranks in tail cone so that attaching bolts will pass easily through upper bell cranks and rod ends. Connect inboard ends of control rods.

(7) Remove index pins from upper bell cranks.

(8) Remove pressure board mechanism access panel from trailing edge of stabilizer, elevator hinge access plate from directly below flight tab bell crank, and bottom half of semi-circular access plate just inboard of flight tab bell crank mounting bracket.

(9) Remove outboard bell crank access panels and disconnect transverse control rods from outboard bell cranks.

(10) Insert index pin 22-J107-1.75 through each flight tab bell crank.

(11) Adjust length of transverse control rods so that attaching bolts will pass easily through rod ends and outboard bell cranks. Connect control rods to outboard bell cranks.

(12) Remove index pins from inboard bell cranks.

(13) Adjust length of rods disconnected from flight tab horns so that connecting bolts will pass easily through rod ends and flight tab horns. Connect control rods and remove index pins from flight tab bell cranks.

(14) Remove rigging tools from control columns, elevators, and elevator flight tabs.

F. Adjust Elevator Stops (*Gust Dampers or **Elevator Stop).

NOTE: Gust dampers or elevator stops are used to limit travel of elevators. Adjustment for gust damper and elevator stops is similar.

(1) Position stabilizer at 0 (±0.50) degrees (refer to paragraph C).

(2) Install tools 30-00003-903 and -904, RGTL #1 to secure elevators in streamline position (see Figure 203).

(3) Attach protractors 30-00003-901 and -902, RGTL #1 to elevator trailing edges and set protractors at 0 (±0.50) degrees; then remove tools used to streamline elevators.

(4) Remove bolt from rod end bearing of elevator stop in each elevator.

(5) Raise elevators to 25 (+1.0, -0.5) degrees and maintain in this position.

(6) Pull out each elevator stop shaft until shaft is bottomed. This rod position corresponds to upward elevator deflection of 25 degrees.

(7) With stop rod fully extended, adjust each stop rod end bearing until bolt will pass through rod end bearing and "A" frame clevis in each elevator, with elevator at 25 (+1.0, -0.5) degrees up.

(8) Install bolt and safety with cotter pin.

(9) Lower elevators until shafts in elevator stops bottom out.

(10) Check that protractors indicate 12 (+1.0, -0.5) degrees. If not, adjust rod ends of stops until both travels are within tolerance.

(11) When elevator travel limits are satisfactory, tighten lock nut on each stop, insert lock key, and secure with safety wire.

(12) Remove protractors from elevators.

*Applicable to airplanes CV1 through CV6, CV26 through CV33, and CV35.
**Applicable to airplanes CV7 through CV25, CV34, CV36, CV37 and on.

G. Adjust Elevator Flight Tab Flutter Dampers.

The push-pull rods connecting the flight tab flutter dampers to the flight tab bell cranks are fixed and do not require adjustment.

H. Adjust Elevator Flutter Dampers.

The linkage connecting the outboard flutter dampers to stabilizer structure is fixed and does not require adjusting. Adjust connecting rod at inboard flutter dampers to a length of 11.16 inches, measured between centers of rod end bearings.

I. Adjust Elevator Pressure Boards.

(1) Set stabilizer at 0 (±0.50) degree position (refer to paragraph C).

(2) Remove pressure board and pressure board mechanism access panels from under side of horizontal stabilizer.

(3) Disconnect push-pull rods connecting pressure board actuating arm to "A" frame on leading edge of elevator.

(4) Install tools 30-00003-903 and -904, RGTL #1 to secure elevators in streamline position.

(5) Adjust push-pull rods so that pressure boards will be in neutral position when rods are reconnected to "A" frames. Inboard pressure boards are in neutral positions when leading edge of board is 1.32 (±0.030) inches above inside surface of stabilizer skin. Outboard pressure boards are in neutral position when leading edge of board is 0.90 (±0.030) inch above inside surface of skin.

(6) Connect push-pull rod between pressure board and "A" frame on leading edge of elevator. Rod end must slip through "A" frame clevis without interference. To align pressure board control rod, remove bolt in hex end on pressure board shaft and rotate hex end as necessary to move pressure board and control rod in desired direction. Lock hex end with bolt after adjustment.

(7) Install protractors 30-00003-901 and -902, RGTL #1 on elevator trailing edges (see Figure 203).

(8) Remove tools 30-00003-903 and -904, RGTL #1 from elevators.

(9) Move elevator to 12 degree position as indicated by protractor.

(10) Remove lock bolt from lower end of pressure metering tube and adjust metering tube until top of slots in tube are flush (±0.2 inch) with upper edge of Teflon plates.

(11) Lock metering tube in adjusted position with lock bolt.

(12) Adjust teflon plates for minimum tube misalignment.

(13) Remove protractors from elevator.

J. Adjust Autopilot Elevator Servo Cables.

(1) Actuate elevator controls so that index pin 22-J107-6.00 can be inserted in upper left bell crank in tail cone aft of stabilizer.

(2) Check that autopilot cable drum is positioned at neutral.

(3) Check that autopilot cables are routed so that CW rotation of autopilot cable drum results in CW rotation of quadrant on elevator lower left bell crank, as viewed inboard.

(4) Check that cable keepers are installed at points where cables contact autopilot cable drum.

(5) Adjust autopilot cables to tension of 105 (±10) pounds at 70 degrees F (21 degrees C). Increase or decrease cable tension 0.50 pound for each degree F (1.00 pound for each degree C) increase or decrease respectively in free air temperature.

(6) Safety cable terminal anchoring screws and clips on autopilot cable drum and cable turnbuckles with safety wire.

K. Adjust Elevator Auxiliary Tabs.

(1) Disconnect spring-cartridge and shear-fail control rods from static levers on stabilizer pivot shafts.

(2) Check that stabilizer is positioned at 0 (±0.50) degrees.

(3) Install tools 30-00003-903 and -904, RGTL #1 and secure elevators in neutral position.

(4) Install protractors 30-00003-901 and -902 RGTL #1 on elevators and adjust to read 0 (±0.50) degrees.

(5) Install protractor 30-00003-901 RTGL #2 (see Figure 203) to measure tab travel.

(6) Set auxiliary tab at 12 (±0.25) degrees trailing edge down.

(7) Using emergency trim crank, position stabilizer at 4.50 (±0.10) degrees trailing edge "up" as indicated by protractors on rigged elevators and check that stabilizer pivot shaft levers are horizontal.

(8) Install index pins 22-J107-2.25 in auxiliary tab bell cranks.

(9) Disconnect auxiliary tab push-pull rods from auxiliary tab bell cranks.

(10) Adjust length of push-pull rods so that bolt will pass through rod ends and auxiliary tab bell cranks when auxiliary tab is at 12 (±0.25) degrees trailing edge down.

(11) Tighten lock nuts on push-pull rods and install rods on auxiliary tab bell cranks.

(12) Adjust length of spring-cartridge and shear-fail control rods so that bolt will pass through stabilizer pivot shaft static levers and rod ends.

(13) Tighten lock nuts on spring-cartridge and shear-fail control rods, lock tab washers, and install rods on stabilizer pivot shaft static levers.

(14) Remove index pins from auxiliary tab bell cranks and rigging tools and protractors from elevators.

L. Adjust Elevator Downspring Assembly.

(1) Check that flaps are fully retracted.

(2) Disconnect downspring flexible drive shaft from flap central drive gearbox.

(3) Using flexible drive shaft, manually rotate downspring drive screw until distance between centerline of drive nut and aft end of drive screw is 11.60 (±0.5) inches (flaps fully retracted).

(4) Reinstall flexible drive shaft on central drive gear box.

(5) Move flaps "full down" and then raise to 27-degree down position.

(6) Measure distance between centerline of roller on downspring indicator switch (No. S479) and cam plate surface break line. Distance must measure between 0.03 and 0.09 inch. Loosen screws in switch mounting channel and adjust channel if necessary. Tighten screws if loosened.

M. Adjust Control Column Stops (see Figure 201).

(1) Using control columns, move elevators through their full travel. Bottoming of the shaft in the elevator stops should limit elevator travel to 25 (+1.0, -0.5) degrees trailing edge up and 12 (+1.0, -0.5) degrees trailing edge down.

(2) Place index pins 22-J107-2.0 through the forward "T" bell cranks on each side of the airplane at fuselage station 244 (see Figure 201).

(3) Adjust elevator outboard stops at fuselage station 250 to a distance of 4.25 (±0.06) inches from the center of top of stop to nearest point on forward "T" bell crank.

(4) Adjust elevator inboard stops at fuselage station 250 to a distance of 2.36 (±0.06) inches from center of top of stop to nearest point on forward "T" bell crank.

(5) Remove index pins. The stops are adjusted to allow a control column travel of 5.00 (±0.25) inches forward of neutral, and 9.50 (±0.25) inches aft of neutral.

N. Adjust Flight Tab Stops (see Figure 201).

(1) With horizontal stabilizer in the 0 (±0.5) degree position, attach tools 30-00003-903 and -904, RGTL #1 to lock elevators in streamline position with stabilizer.

(2) Insert index pin 22-J107-1.75 in each elevator flight tab bell crank.

(3) Install protractor 30-00003-901, RGTL #2 on elevator (see Figure 203).

(4) Check that flight tab trailing edge is at 0 (±0.5) degrees on protractor with index pin in flight tab bell crank. Remove index pin.

(5) Adjust flight tab stop bolts by adding or removing washers under bolt heads. Adjust upper stop to limit tab travel to 12 (±0.5) degrees trailing edge up and lower stop to limit tab travel to 25 (±0.5) degrees trailing edge down.

(6) Remove rigging tools from elevators and return airplane to normal configuration.

2. Adjustment/Test Elevator Control System Functional Test

A. Equipment Required.

(1) Two protractors 30-00003-901, RGTL #2 and two protractors 30-00003-901 and 902 RGTL #1 for measuring elevator surface and elevator flight and auxiliary tab travel.

(2) Tools 30-00003-903 and -904, RGTL #1 for locking elevators in streamline with horizontal stabilizer.

(3) Spring scale with adapter, tool 22-04302TSTO-P, for attaching scale to elevator trailing edge. Scale to be calibrated from 0 to 25 pounds.

(4) Spring scale with adapter 22-40003 for attaching scale to control wheels. Scale to be calibrated from 0 to 205 pounds.

(5) Specially calibrated cable tensiometer for measuring tension of 1/8-inch 1 x 19 non-flex control cables.

(6) Standard tensiometer for measuring tension of 3/32-inch 7 x 7 elevator autopilot cables.

(7) Thermometer calibrated in degrees F or C.

(8) Two index pins 22-J107-2.0.

(9) External source of electrical power.

(10) External source of hydraulic power.

(11) Tool 30-12000 to measure elevator friction.

(12) Dial indicator and adapter, tool 22-44600, to measure auxiliary tab free play.

(13) Spring scale calibrated in 0.1 pound increments from zero to 100 pounds and adapter to measure forces required to move control column aft.

B. Check System Clearances.

(1) Using emergency stabilizer trim crank, adjust horizontal stabilizer until 0 degree position is indicated on dial indicator located on pilots' pedestal. Horizontal stabilizer shall move to streamline position.

(2) Check to insure that all components in elevator system requiring safety wire have been properly safetied.

(3) With control column in neutral position, visually inspect all fair-leads, cranks, terminals, pressure seals, turnbuckles, flutter dampers, gust dampers, etc, for correct installation.

(4) Slowly move control column full aft and then full forward. Observe elevator control sytem components while moving control column through full range of travel. All components in elevator system shall clear surrounding structure at all control column positions.

(5) Check elevator flight tab control cables for proper tension. Flight tab control cable tension shall be 205 (±25) pounds at 70 degrees F (21 degrees C). Increase or decrease specified cable tension 1.0 pound for each degree F (2.0 pounds for each degree C) increase or decrease in free air temperature.

(6) Using standard tensiometer, check that tension of elevator autopilot cables is 105 (±10) pounds at 70 degrees F (21 degrees C). Increase or decrease tension value 0.5 pound for each degree F (1.0 pound for each degree C) increase or decrease respectively in free air temperature.

C. Check Balance Board and Pressure Board Seals.

(1) Open shroud doors covering balance board and pressure board compartments in left stabilizer.

(2) Check all balance board and pressure board seals for tears, proper installation, etc.

(3) Manually deflect left elevator downward until elevator stop makes contact. Check that balance boards and pressure boards move freely and that balance board seals do not tend to bind or stick.

(4) Manually deflect left elevator upward until elevator stop makes contact. Note that balance boards and pressure boards move freely and that balance board seals do not tend to bind or stick.

(5) Return left elevator to neutral.

(6) Repeat steps (1) through (5) substituting right for left.

(7) Close and secure right and left balance board and pressure board shroud doors.

D. Check Control Column Rigging (see Figure 201).

(1) Check that flaps are in "full down" position. If not, lower flaps (refer to Removal/Installation Elevator, Paragraph 1.C. Step (1)).

(2) Insert index pins 22-J107-2.0 in elevator control forward "T" bell cranks. Measure distance between crack on top of control column where control column housing cover butts against housing and a point just above the horizon flight director indicator on instrument panel. Distance must measure 9.70 (±0.15) inches. Measurement must be made with no force applied to either control column.

(3) Measure distance from center of the top of cockpit outboard stops on both sides of the airplane to nearest point on forward "T" bell cranks. Distance should be 4.25 (±0.06) inches.

(4) Measure distance from center of top of cockpit inboard stops on both sides of airplane to nearest point on forward "T" bell cranks. Distance should be 2.36 (±0.06) inches.

(5) Remove index pins from forward "T" bell cranks.

E. Test Elevator Flight Tab Travel.

(1) Check that flaps are in "full down" position. If not, lower flaps (refer to Removal/Installation Elevator, Paragraph 1.C. Step (1)).

(2) Adjust horizontal stabilizer to 0 (±0.50)-degree position. If no hydraulic power on ship, use emergency trim hand crank to adjust stabilizer position.

(3) Install tools, 30-00003-903 and -904, RGTL #1 and secure elevators in streamline position (see Figure 203).

(4) Install two protractors 30-00003-901, RGTL #2 (see Figure 203) to measure tab travel.

(5) Move control column aft until elevator flight tab stops are contacted. Elevator flight tabs shall be 25 (±0.5) degrees "down" from neutral position.

(6) Move control column forward until flight tab stops are contacted. flight tabs shall be 12 (±0.5) degrees "up" from neutral position.

(7) Return control column to neutral position (refer to paragraph D).

(8) Pressurize No. 1 and No. 2 hydraulic systems and move flap control lever to 0° detent (refer to step (1)). Flight tabs shall move to 12 (±0.5)-degree "up" position.

(9) Move control column aft until elevator flight tab stops are contacted. Flight tabs shall move 25 (±0.5) degrees "down" from streamline position.

(10) Return control column to neutral position.

(11) Remove rigging tools and move flap control lever to DOWN detent.

F. Test Elevator Friction.

(1) Check that flaps are in full-down position. If not, lower flaps (refer to Removal/Installation Elevator, paragraph 1.C. Step (1)).

(2) Install contour boards, tool No. 30-00003-903 and -904, RGTL #1 and streamline elevators with stabilizer (see Figure 203).

(3) Install protractors 30-00003-901 and -902, RGTL #1 on trailing edge of elevators (see Figure 203). Adjust protractors to read 0 degrees.

(4) Remove contour boards from elevators.

(5) Attach spring scale adapter, tool 30-12000, to left elevator trailing edge just outboard of flight tab and manually deflect elevator to 5 degrees "down" from neutral.

(6) Using spring scale, raise left elevator slowly to 5 degrees "up" and note maximum force required.

(7) Using spring scale, move left elevator from 5 degrees "up" to 5 degrees "down" and note maximum force required.

(8) Average of forces noted in steps (6) and (7) shall not exceed 6.6 pounds.

(9) Using spring scale, continue downward pull on left elevator until elevator stop is contacted and note maximum force required. If airplane is equipped with elevator gust dampers, maximum force required to contact elevator stop shall not exceed 15 pounds. If airplane is equipped with elevator stops, maximum force required to contact stop shall not exceed 13 pounds.

NOTE: Elevator stops can be distinguished from elevator gust dampers by lack of hydraulic fluid reservoir beneath damper cylinder.

(10) Check that elevator flight tab deflects downward and that elevator is deflected "down" 12 (+1.0, -0.5) degrees when stop makes contact.

(11) Return left elevator to neutral.

(12) Using spring scale, deflect left elevator upward until stop is contacted and note maximum force required. If airplane is equipped with elevator gust dampers, maximum force required to contact stop shall not exceed 22 pounds. If airplane is equipped with elevator stops, maximum force required to contact stop shall not exceed 20 pounds.

NOTE: As elevator is deflected upward, elevator flight tab stops will make contact at one-half of elevator travel. Move control column aft at least one-half travel in order to clear flight tab stops.

(13) Check that flight tab deflects upward and that left elevator is deflected upward 25 (+1.0, -0.5) degrees when stop makes contact.

(14) Return left elevator to neutral and remove spring scale.

(15) Repeat steps (5) through (14) substituting right for left.

G. Test Elevator Spring-Loaded Crossover Tubes.

NOTE: The elevator control system incorporates two spring-loaded crossover tubes. The forward crossover tube connects the two "T" cranks at the forward end of the fuselage cable circuit. The aft crossover tube connects the upper aft bell cranks above the flight tab centering spring (see Figure 201).

(1) Check that flaps are in full-down position. If not, lower flaps (refer to Removal/Installation Elevator, Paragraph 1.C. Step (1)).

(2) Install tool, 30-00003-904, RGTL #1 to secure RH elevator in streamline position (see Figure 203).

(3) Install batten boards to secure RH elevator flight tab in neutral position.

(4) With LH elevator in approximately neutral position, install spring scale adapter, tool 22-04302 TSTO-P, on pilot's (left) control column (see 27-1-0, Figure 204). Attach spring scale and pull control column aft. Force required to break out both override springs shall be 100 (±25) pounds.

(5) Return control column to neutral position.

(6) Manually deflect and secure LH elevator in "full up" position.

(7) Using spring scale, pull control column aft. Force required to fully deflect flight tab shall be 150 (±25) pounds.

(8) Return control column to neutral position.

(9) Manually deflect and secure LH elevator in "full down" position.

(10) Using spring scale, pull control column forward until LH elevator flight tab stop makes contact. Force required to break out both override springs shall be 100 (±25) pounds. Force required to fully deflect flight tab shall be 125 (±25) pounds.

(11) Return control column to neutral position.

(12) Remove rigging tools from RH elevator flight tab and from pilot's control column.

H. Test Auxiliary Tab Travel.

(1) Install tool 30-00003-903 and -904, RGTL #1 to secure elevators in streamline position (see Figure 203).

(2) Install protractor, tool 30-00003-901, RGTL #1 on trailing edge of left-hand stabilizer (see Figure 203).

(3) Install protractors, tool 30-00003-901, RGTL #2 at left and right-hand auxiliary tabs (see Figure 203).

(4) Using emergency hand crank, set stabilizer at 0-degree position by aligning reference hole in stabilizer leading edge with reference rivets in fuselage skin. Set stabilizer protractor at 0 degree.

NOTE: If hydraulic system is pressurized, normal stabilizer trim control on pilots' pedestal, may be used to make stabilizer position adjustments.

(5) Adjust stabilizer to 4.5-degree airplane-nose-up position as indicated on stabilizer protractor. Auxiliary tabs should be at 12 (±0.25) degrees down on protractors.

(6) Actuate stabilizer to following positions, auxiliary tabs must deflect "down" as follows:

Stabilizer Position (Degrees)	Auxiliary Tab Deflection (Degrees)
2.5 trailing edge down	4.5 (±0.5) down
0	7 (±0.5) down
4.5 trailing edge up	12 (±0.25) down
9.0 trailing edge up	17.5 (±1.0) down
13.25 trailing edge up	23 (±1.0) down

NOTE: Difference between RH and LH protractor readings at any stabilizer position shall not exceed 0.5 degree.

(7) Remove rigging tools and return airplane to normal configuration.

I. Test Elevator Control System Friction and Elevator Downspring Forces.

(1) Install contour boards, tool 30-00003-903 and -904, RGTL #1 to secure elevators in streamline position.

(2) Install protractor 30-0000-901, RGTL #2 on LH elevator to measure flight tab travel.

(3) Check that flaps are in 36 degree down position. If not, lower or raise flaps (refer to Removal/Installation Elevator, Paragraph 1.C. Step (1)).

(4) Attach spring scale with adapter to pilot's control column to measure forces required to move control column aft. Adapter must be located on axis of control wheel rotation.

(5) Starting with control column in forward position, slowly pull aft on control column with spring scale and adapter. While control column is moving, record spring scale reading at 3 degrees flight tab trailing edge up and at 3 degrees flight trailing edge down.

(6) Readings recorded shall be less than 25.0 pounds at 3 degrees flight tab trailing edge up and less than 32.8 pounds at 3 degrees flight tab trailing edge down.

(7) Permit pilot's control column to slowly return to forward position. While control column is mvoing, record spring scale readings at 3 degrees flight tab trailing edge down and 3 degrees flight tab trailing edge up.

(8) Readings recorded shall be greater than 14.3 pounds at 3 degrees flight tab trailing edge down and greater than 6.2 pounds at 3 degrees flight tab trailing edge up.

(9) Difference between readings recorded in steps (5) and (7) shall not exceed 10.7 pounds at 3 degrees flight tab trailing edge up and 3 degrees flight tab trailing edge down.

(10) Remove contour boards and move RH and LH elevators to trailing edge "full down" position and secure.

(11) Move flap control lever to 0° detent and allow flaps to move to corresponding position.

(12) Starting with control column in forward position, slowly pull aft on control column with spring scale and adapter. While control column is moving, record spring scale readings at 9 degrees flight tab trailing edge up, flight tab streamline, and at 9 and 21 degrees flight tab trailing edge down.

(13) Readings recorded shall be less than 34.2 pounds at 9 degrees flight tab trailing edge up, 45.4 pounds at flight tab streamline, 56.4 pounds at 9 degrees flight tab trailing edge down, and 74.0 pounds at 21 degrees flight tab trailing edge down.

(14) Permit pilot's control column to slowly return to forward position. While control column is moving, record spring scale readings at 21 and 9 degrees flight tab trailing edge down, flight tab streamline, and at 9 degrees flight tab trailing edge up.

(15) Readings recorded shall be greater than 51.4 pounds at 21 degrees flight tab trailing edge down, 34.8 pounds at 9 degrees flight tab trailing edge down, 22.8 pounds at flight tab streamline, and 6.4 pounds at 9 degrees flight tab trailing edge up.

(16) Difference between recorded readings in steps (12) and (14) shall not exceed 15.6 pounds at 9 degrees flight tab trailing edge up, 10.8 pounds at flight tab streamline, and at 9 and 21 degrees tab trailing edge down.

(17) Move RH and LH elevators to elevator trailing edge "full up" position and secure.

(18) Move flap control lever to 50° detent and allow flaps to move to corresponding position.

(19) Repeat step (12). Recorded readings shall be less than 32.7 pounds at 9 degrees flight tab trailing edge up, less than 40.8 pounds at flight tab streamline, less than 50.3 pounds at 9 degrees flight tab trailing edge down, and less than 66.4 pounds at 21 degrees flight tab trailing edge down.

(20) Repeat step (14). Readings recorded shall exceed the following: 32.0 pounds at 21 degrees flight tab trailing edge down, 21.7 pounds at 9 degrees flight tab trailing edge down, 15.7 pounds at flight tab streamline and 9.7 pounds at 9 degrees flight tab trailing edge up.

(21) Difference between recorded readings in steps (19) and (20) shall not exceed 12.2 pounds at 9 degrees flight tab trailing edge up, 12.6 pounds at flight tab streamline, 14.5 pounds at 9 degrees flight tab trailing edge down and 17.8 pounds at 21 degrees flight tab trailing edge down.

(22) Remove rigging tools and return airplane to normal configuration.

J. Test Elevator Downspring Indicator.

(1) Check that flaps are in "full down" position. If not, lower flaps (refer to Removal/Installation Elevator, Paragraph 1.C. Step (1)).

(2) Move flap control lever to 27° detent and allow flaps to move to corresponding position.

(3) Check that roller on elevator downspring indicator switch (S479) is contacting cam plate surface within 0.03 to 0.09 inch of plate surface breakline. (see 27-5-24, Figure 201).

(4) Place flap control lever in 0° detent and allow flaps to move to "full up" position.

(5) Elevator downspring indicator on pilot's instrument panel shall show a C.

(6) Place flap control lever successively in 10°, 27°, 36°, and 50° detents, one detent at a time and allow flaps to move to position selected.

(7) Elevator downspring indicator shall read as follows:

FLAP CONTROL LEVER POSITION	ELEVATOR DOWNSPRING INDICATOR
0°	C
10°	T
27°	T
36°	L
50°	L

(8) Repeat step (6) except move flap control lever one detent at a time to 50°, 36°, 27°, 10° and 0° detents. Indicator shall read as shown in step (7).

(9) Disconnect and remove all test equipment and restore airplane to normal configuration.

3. Adjustment/Test - Elevator Pressure Board Compartment Leak Test

A. Equipment Required - Source of dry filtered air pressure capable of pressurizing pressure board compartments to 4.0 inches Hg at a flow rate of 120 cubic feet per minute. Test stand to be equipped with a flowmeter capable of measuring from 0 to 120 cubic feet per minute airflow.

B. Leak Test Pressure Board Compartments.

(1) Manually deflect left-hand elevator to "full up" position.

(2) Connect source of air pressure to air intake at leading edge of left-hand horizontal stabilizer. Attach pressure pickup to one of drain holes in pressure board compartments.

(3) Turn on and slowly increase pressure source until pressure gage on test stand indicates that pressure board compartments are pressurized to 4.0 inches Hg.

(4) Note airflow required to maintain pressure board compartment pressure at 4.0 inches Hg. Required airflow shall not exceed 105 cubic feet per minute.

(5) Slowly reduce pressure in pressure board compartments to 1.0 inch Hg.

(6) Airflow required to maintain 1.0 inch Hg. pressure shall not exceed 55 cubic feet per minute.

(7) When pressure test of left-hand pressure board compartments is satisfactory, reduce pressure to 0 Hg., disconnect pressure source from air intake, and repeat Steps (1) through (6) substituting right-hand for left-hand.

NOTE: Difference between right-hand and left-hand flow rates noted in Steps (4) and (6) shall not exceed ten percent of lowest values noted.

(8) When all tests are satisfactory, remove test equipment and return airplane to normal configuration.

1. Removal/Installation Elevator (see Figure 201)

A. General.

Removal and installation procedures for the elevators are identical except for being left and right assemblies. The procedures for removing and installing only the left elevator will be included.

Prior to elevator installation, it must be ascertained that the elevator is balanced. Date of balancing and the number of pounds nose heavy are stamped on the elevator nameplate. Any elevator flight tab can be used without rebalancing the elevator provided the tab is balanced and its total weight does not exceed 25.50 pounds. The elevator auxiliary tabs are not balanced, and any auxiliary tab may be used without rebalancing the elevator provided the tab's total weight does not exceed 6.50 pounds. (Do not include attaching parts (nuts, bolts, and washers) when weighing tabs.) If a flight or auxiliary tab exceeds the above weight limitations, the elevator must be rebalanced (refer to the 990 Structural Repair Manual).

B. Equipment Required.

(1) Sling (part number to be furnished when available).

(2) Hoist capable of lifting elevator.

(3) Stand suitable for reaching elevator and side access door to tail cone.

(4) Tool 22-41000 RGTL #1 for securing control column in elevator streamline position (see 27-1-0, Figure 203).

(5) Protractor 30-00003-901 RGTL #1 (30-00003-902 RGTL #1 for RH elevator) for measuring elevator surface travel (see 27-5-0, Figure 203).

(6) Protractor 30-00003-901 RGTL #2 for measuring tab travel (see 27-5-0, Figure 203).

(7) Torque wrench calibrated in inch-pounds.

(8) The following, or equivalent index pins: 22-J107-2, 22-J107-2.25, and 22-J107-3.25.

(9) External source of hydraulic and electrical power (for use only if flaps are not in "full down" position).

(10) Graphite grease, Specification MIL-G-7178, or equivalent.

C. Remove Elevator.

(1) Check that flaps are in "full down position. If not, lower flap as follows:

(a) Connect external source of electrical power and close FLAP ASYM CONT circuit breaker on main circuit breaker panel (refer to Chapter 24, ELECTRICAL POWER).

(b) Check that FLAP PWR SELECT switch is positioned on NORMAL #1, the flap control lever setting corresponds roughly with position of flaps, and that flap travel area is clear.

(c) Connect external source of hydraulic power and pressurize No. 1 and No. 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

CAUTION: DO NOT OPERATE FLAPS WHEN BOTH HYDRAULIC SYSTEMS ARE PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE, AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(d) Move flap control lever to 50° detent.

(2) Insert index pin 22-J107-2 in elevator RH forward "T" bell crank to secure control column in neutral position.

NOTE: Elevator downspring exerts negligible force on elevator control system when flaps are fully extended.

(3) Remove upper and lower pressure board mechanism access panels, balance weight access panels, auxiliary tab control rod access panels, and elevator hinge access plates.

(4) Disconnect auxiliary tab control rod from auxiliary tab bell crank.

(5) Disconnect elevator inboard flutter damper arm from aft end of control rod connected to stabilizer spar.

(6) Disconnect outboard flutter dampers at link attachment to stabilizer trailing edge spar.

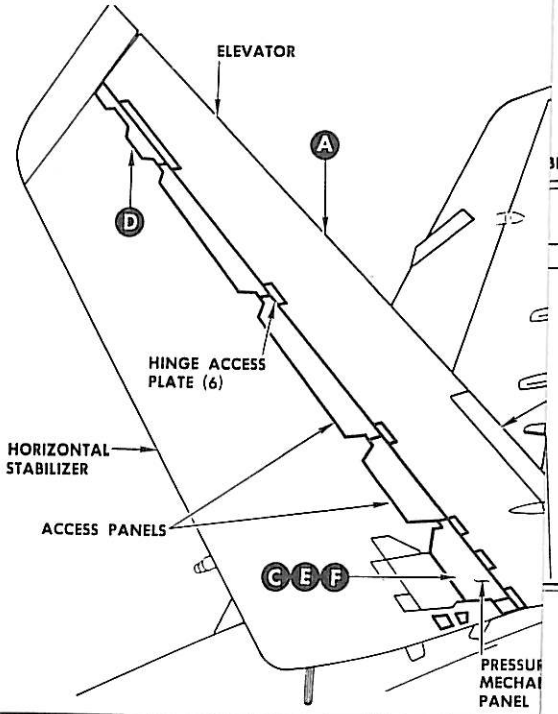
(7) Disconnect elevator flight tab flutter damper linkage and flight tab control rod from elevator flight tab bell crank.

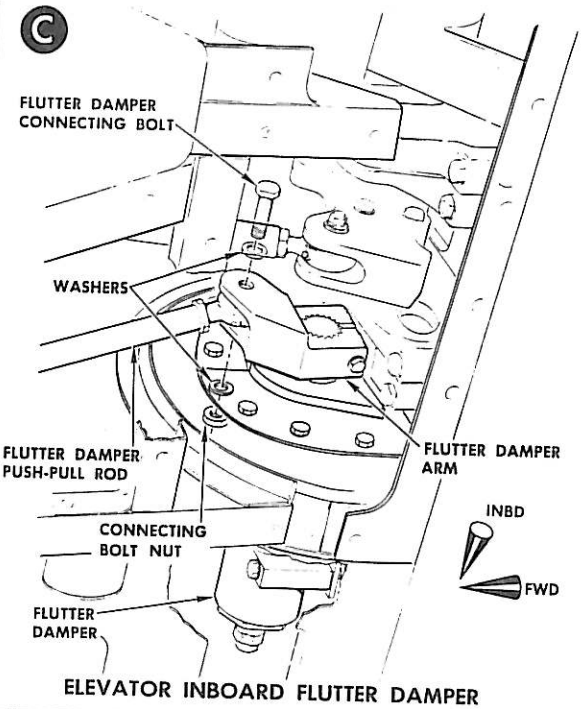
(8) Disconnect elevator stop struts from elevator.

(9) Disconnect elevator stop shaft from A frame on elevator.

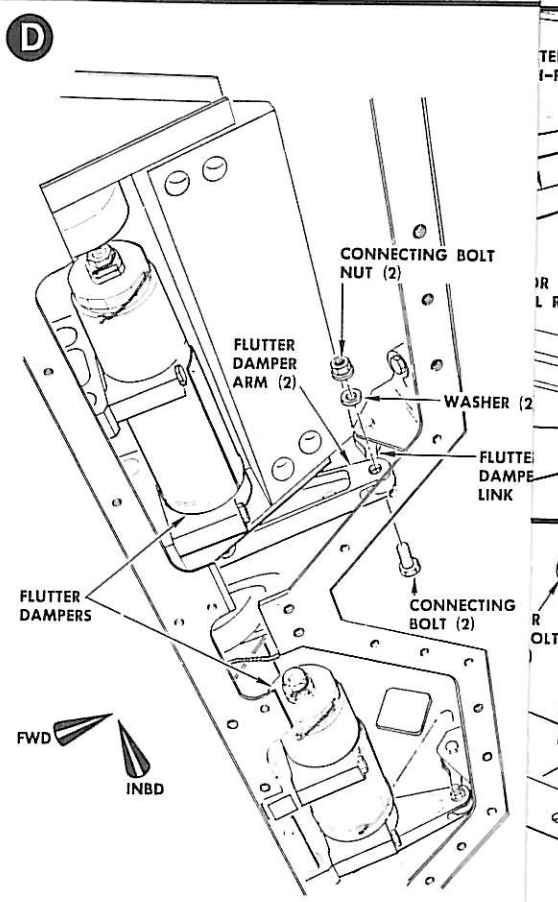
(10) Disconnect pressure board linkage from elevator.

(11) Disconnect bonding jumper at each hinge point (seven places).





ELEVATOR INBOARD FLUTTER DAMPER



ELEVATOR OUTBOARD FLUTTER DAMPERS

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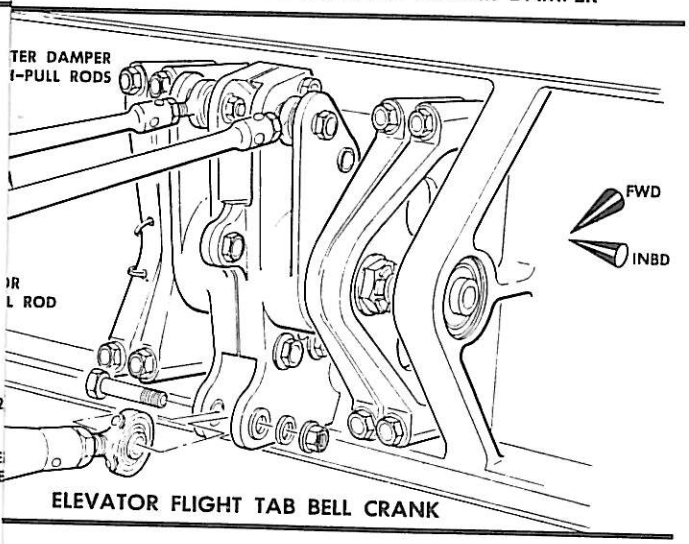
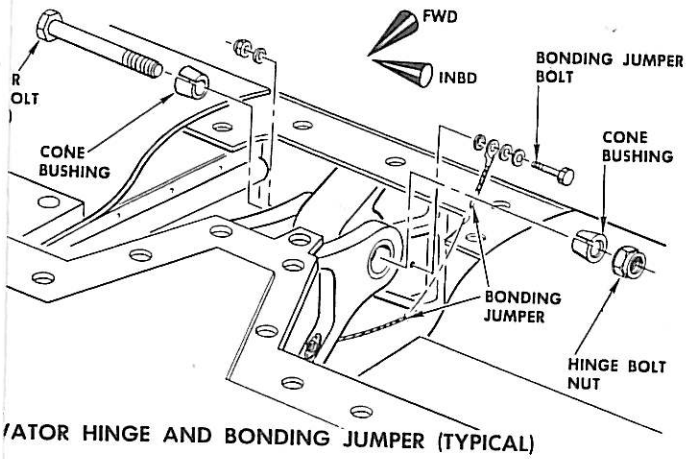


ELEVATOR FLIGHT TAB BELL CRANK



VATOR HINGE AND BONDING JUMPER (TYPICAL)

(12) Remove three screws in elevator surface aft of hinge No. 2, two bolts in center of inboard balance weight adjacent to hinge No. 1, and second and third elevator balance board seal bolts inboard of hinge No. 4 and attach sling at all three points.

(13) Connect sling to hoist and operate hoist to support weight of elevator.

(14) Remove hinge bolt and cone bushings at each hinge point. (Cone bushings are not used at hinge No. 3.)

(15) Slide elevator aft to clear horizontal stabilizer and lower elevator clear of airplane.

D. Install Elevator.

(1) Attach sling to elevator (refer to Step 1.C.(1)).

(2) Raise elevator to stabilizer and align elevator and stabilizer hinge fittings.

(3) Install split cone bushings and hinge bolts (refer to 27-0, Installation Split Cone Bushings).

NOTE: Cone bushings are not used at hinge No. 3. Torque hinge bolt nuts to between 160 and 190 inch-pounds.

(4) Deleted.

(5) Remove elevator sling.

(6) Attach bonding jumpers to elevator structure ribs with screws, washers and nuts (seven places).

(7) Install bolts and nuts to attach elevator stop struts to elevator; torque nuts 100 to 140 inch-pounds.

(8) Set stabilizer at 0-degree trim. Small hole in stabilizer leading edge must be aligned with two brazier head rivets in side of fuselage.

(9) Deleted.

(10) Check elevator travel and connect stop shaft (refer to 27-5-6, step C.(5) through C.(9).

(11) Install protractor 30-00003-901 RGTL #2 for measuring tab travel (see 27-5-0, Figure 203).

(12) Remove lower half of inboard elevator flutter damper access door just inboard from flight tab bell crank.

(13) Insert index pin 22-J107-2 through flight tab bell crank.

(14) Install tool 30-00003-903 RGTL #1 to secure elevator in streamline position (see 27-5-0, Figure 203).

(15) Check position of elevator flight tab. If flight tab is not in streamline position, disconnect control rods from flight tab horn, maintain flight tab in streamline position, adjust control rods to length between rigged flight tab bell crank and tab, and connect control rods to flight tab horn.

(16) Connect rods between flight tab flutter dampers and flight tab bell-crank.

(17) Check operation of outboard flutter dampers (refer to Removal/Installation Elevator Outboard Flutter Dampers) and connect flutter dampers to stabilizer trailing edge spar.

(18) Check operation of inboard flutter damper (refer to Removal/Installation Elevator Inboard Flutter Damper), adjust connecting rod to a length of 11.16 inches, measured between centers of rod end bearings, and connect flutter damper to stabilizer spar.

(19) Remove elevator inboard bell crank access door and insert index pin 22-J107-3.25 through inboard bell crank.

NOTE: With control column secured in elevator neutral position, index pin should pass through bell crank with no readjustment. If index pin does not fit easily, position of control column should be checked before any readjustment of elevator control system is attempted.

(20) Connect elevator flight tab control rod to flight tab bell crank.

(21) Connect pressure board linkage. Make sure that pin-bolts are installed in A frames and extend through stabilizer rib into receptacle on elevator leading edge.

(22) With elevator secured in streamline position, set pointer of protractor 30-00003-901 RGTL #1 at 0 degrees.

(23) Using emergency stabilizer trim handcrank, set stabilizer at 4.5 (±0.5) degrees leading edge down.

(24) Maintain auxiliary tab at 4.5 (±0.5) degrees trailing edge down.

(25) Insert index pin 22-J107-3.25 through auxiliary tab bell crank. If index pin does not fit, disconnect control rods from auxiliary tab, insert index pin, and adjust control rods to fit between bell crank and secured tab.

(26) Adjust auxiliary tab spring-cartridge control rod to a free length of 26.28 inches, measured between centers of rod end bearings. Connect control rod to auxiliary tab bell crank. There will be no tension on control rod if stabilizer is properly positioned and index pin is installed in bell crank.

(27) Adjust auxiliary tab shear-fail control rod to length between auxiliary tab static lever and rigged bell crank and connect rod to bell crank.

(28) Remove rigging tools used to secure elevator, and index pins used in elevator RH forward "T" bell crank, elevator inboard bell crank, flight tab bell crank, and auxiliary tab bell crank.

(29) Test system (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

NOTE: If an elevator only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, paragraphs 2.E., 2.F., 2.H., and 2.I.

(30) Return airplane to normal configuration.

ELEVATOR FLIGHT TABS - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Flight Tab (see Figure 201)

A. General.

Removal and installation procedures for the elevator flight tabs are identical except for being left and right assemblies. Prior to elevator flight tab installation, it must be ascertained that flight tab is balanced. Date of balancing, number of pounds nose heavy, and weight are stamped on tab nameplate. Flight tab installation will not affect elevator balance if tab's total weight does not exceed 25.50 pounds. (Do not include attaching parts (nuts, bolts, and washers) when weighing tab.) If the flight tab weight exceeds 25.50 pounds, the elevator must be rebalanced. (Refer to the Structural Repair Manual.)

B. Equipment.

(1) Graphite grease, Specification MIL-G-7187, or equivalent.

(2) Stand suitable for reaching elevators.

(3) Torque wrench calibrated in inch-pounds.

(4) Tool 30-00003-903 LH, or -904 RH, RGTL #1.

(5) Index pin 22-J107-2.0.

(6) External source of hydraulic power (for use only if flaps are not in "full down" position).

C. Remove Elevator Flight Tab.

(1) Check that flaps are in "full down" position. If not, lower flaps (refer to Removal/Installation Elevator, Paragraph 1.C., Step (1)).

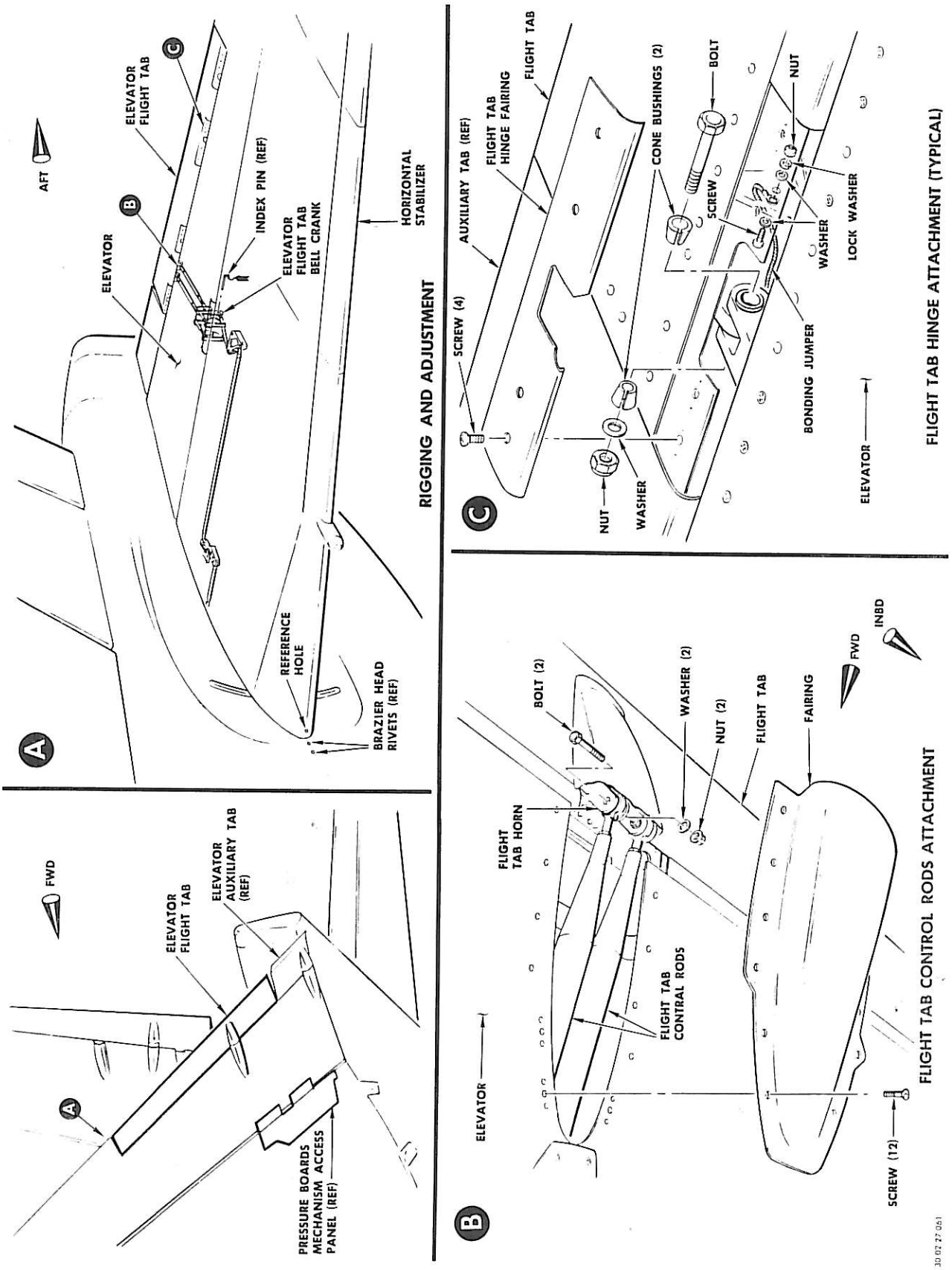
NOTE: Elevator downspring exerts negligible force on elevator control system when flaps are fully extended.

(2) Remove flight tab horn cover and control fairing.

(3) Remove pressure board mechanism access panel from lower trailing edge of stabilizer.

(4) Remove access panel from top of stabilizer directly above elevator flight tab bell crank and remove elevator hinge access plates from above and below bell crank.

(5) Remove flight tab hinge access plates.



Elevator Flight Tab Installation
Figure 201

(6) Deleted.

(7) Disconnect bonding jumpers from flight tab in four places.

(8) Disconnect both control rods from flight tab horn.

(9) Remove flight tab hinge bolts, slide flight tab aft to clear hinge fittings, and remove flight tab. Note positions of tapered bushings used at each hinge point.

D. Install Elevator Flight Tab.

(1) Align flight tab and elevator hinge fittings.

(2) Install split cone bushings and hinge bolts (refer to 27-0, Installation Split Cone Bushings).

NOTE: Torque flight tab hinge bolt nuts to between 50 and 70 inch-pounds.

(3) Deleted.

(4) Move flight tab up and down to travel limits and check for binding. There must be no discernible binding or side load on any fitting.

(5) Connect bonding jumpers (four places). Make sure that jumpers are routed so they will not interfere with hinge fittings.

(6) Set stabilizer at 0-degree trim. Small hole in leading edge of stabilizer must be in line with brazier head rivets in side of fuselage.

(7) Install tool 30-00003-903 or -904 RGTL #1 to secure elevator in streamline position (see 27-5-0, Figure 203).

(8) Install protractor 30-00003-901 RGTL #2 (see 27-5-0, Figure 203) and maintain elevator flight tab in streamline position.

(9) Insert index pin 22-J107-2.0 in flight tab bell crank.

(10) Adjust length of flight tab control rods to distance between rigged flight tab bell crank arms and positioned flight tab. Tighten control rod lock nuts and install aft end of control rods at flight tab horns.

(11) Remove index pin from flight tab bell crank and rigging tool from elevator.

(12) Test system (refer to 27-5-0 Adjustment/Test Elevator Control System Functional Test).

NOTE: If an elevator flight tab only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, paragraphs 2.E. and 2.I.

(13) Install the small hinge fairing plates on underside of flight tab leading edge (three places).

(14) Install control rod and hinge balance weight fairings on elevator and flight tab (four places).

(15) Return airplane to normal configuration.

ELEVATOR PRESSURE BOARDS - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Pressure Boards (see Figure 201)

A. Equipment Required.

(1) Pliers - Snap-ring.

(2) Taper reamer - No. 21 standard B & S.

(3) Tape - Temp-R-Tape No. DBV310283 (pressure sentitive) (Connecticut Hard Rubber Co.), or equivalent.

(4) Sealing compound - EC1291 or EC1653B (Minnesota Mining and Manufacturing Co.) or equivalent.

*(5) Safety wire - Specification MS20995C91.

(6) Spring scale - Calibrated in 0.25-pound increments from 0 to 30 pounds.

B. Remove Elevator Pressure Board.

(1) Remove pressure board access doors from upper and lower sides of horizontal stabilizer.

(2) Remove pressure board mechanism access door from lower side of stabilizer.

(3) Disconnect pressure board control rod at "A" frame on elevator.

(4) Remove taper pins from aft end of pressure board.

(5) Remove *safety wire (**cable) from upper end and bolt from lower end of pressure metering tube and remove metering tube.

(6) Remove bolts and metal strips attaching seal to pressure board.

(7) Remove snap ring retaining bearing in stabilizer rib at end of pressure board shaft incorporating hex nut.

(8) Pull pressure board shaft (with hex nut) out of pressure board and stabilizer rib.

NOTE: Bearing will be removed from stabilizer rib when pressure board shaft is removed.

(9) Pull pressure board lever assembly out of other side of pressure board.

(10) Remove pressure board through pressure board access in lower side of horizontal stabilizer.

*Applicable to airplanes CV5 through CV19 and CV28 and on until Service Bulletin No. 27-36A is accomplished.

**Applicable to airplanes CV1 through CV4 and CV20 through CV27. Also applicable to airplanes CV5 through CV19 and CV28 and on after Service Bulletin No. 27-36A has been accomplished.

C. Install Elevator Pressure Board.

NOTE: Steps (1) through (3) apply to installation of new pressure board or component.

(1) Assemble pressure board, shaft and lever assembly. Lever assembly arm must point up in relation to the upper side of the pressure board. Spotfaced taper pin holes are on lower side of pressure board.

(2) Align taper pin holes and ream with No. 21 standard B & S tapered reamer. Holes through outboard pressure board lever assembly and inboard side of outboard pressure board shall be reamed for AN386-2-21A taper pins. All other taper pin holes shall be reamed for AN386-3-21A taper pins. Small end of taper pin (unthreaded portion) shall protrude not more than 0.062 inch.

(3) Remove taper pins and disassemble pressure board, shaft and lever assembly.

(4) Install pressure board through access opening in lower side of horizontal stabilizer.

(5) Align pressure board and install lever assembly with pressure board control rod installed. Control rod attaching bolt head must be next to pressure board.

(6) Install bearing on pressure board shaft and install pressure board shaft. Check bearing for proper seating in stabilizer rib.

(7) Install taper pins, washers and nuts.

NOTE: Large ends of taper pins must be flush with or above surface of pressure board.

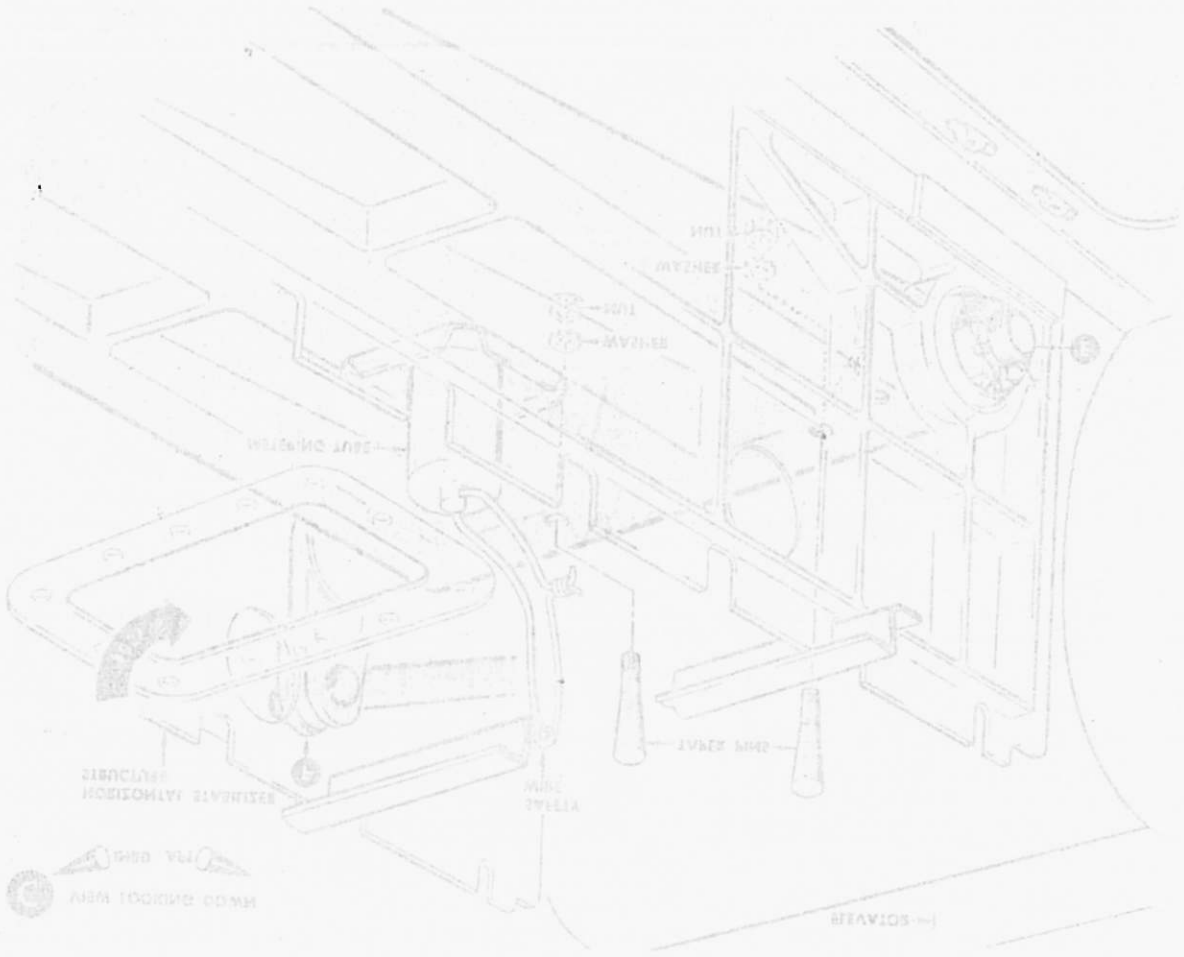
(8) Install snap ring securing bearing and pressure board shaft in stabilizer rib.

(9) Insert pressure metering tube through hole in pressure board and install attaching bolt at lower end of tube.

(10) Install bolts and metal strips attaching seals to pressure boards. Seal edge of all metal strips at curtain edge with sealing compound (EC1291).

(11) Connect spring scale (calibrated from 0 to 30 pounds) to end of inboard pressure board control rod. Starting with pressure board in "full down" position, pull straight aft to raise pressure board to "full up" position and note maximum scale reading. Maximum force required shall not exceed 26.4 pounds.

(12) Repeat step (11) with outboard pressure board. Maximum force required shall not exceed 15.5 pounds.



(13) Check neutral adjustment of pressure board per 27-5-0, steps 1.I.(1), and 1.I.(3) through 1.I.(13).

(14) *Install single-strand loop of safety wire between upper end of pressure metering tube and stabilizer rib. Wire loop must have one inch of slack.

(15) **Install cable between upper end of pressure metering tube and stabilizer rib.

(16) Check installation of pressure sensitive tape (Temp-R-Tape No. DBV310283) in access panel openings. Replace torn or wrinkled tape.

(17) Install access panels and plates and return airplane to normal configuration.

(18) Check elevator control system operation (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

NOTE: If a pressure board only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, steps 2.C.(3) and 2.C.(4), and paragraphs 2.F. and 3.B.

*Applicable to airplanes CV5 through CV19 and CV28 and on until Service Bulletin No. 27-36A has been accomplished.
**Applicable to airplanes CV1 through CV4 and CV20 through CV27. Also applicable to airplanes CV5 through CV19 and CV28 and on after Service Bulletin No. 27-36A has been accomplished.

CONTROL COLUMN - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Control Column (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching nose section door.

(2) Index pins 22-J107-2.0, 22-J107-2.5, and 22-J107-5.0 or equivalent.

B. Remove Elevator Control Column.

(1) Take out 15 screws and remove panel on flight compartment floor surrounding control column.

(2) Disconnect forward end of rod connecting control column elevator arm and elevator forward "T" bell crank.

(3) Disconnect inboard end of aileron control rod from aft arm of aileron lower cable quadrant.

(4) Disconnect end of forward spring-loaded crossover tube from forward arm of aileron lower cable quadrant.

NOTE: Place a length of tape through bearing center and around rod end in such a manner as to prevent bearing from swiveling. If bearing is permitted to swivel approximately 90 degrees from normal position, rollers can drop out and complete disassembly is required to reinstall rollers.

(5) Disconnect springs and remove elevator bob weight attaching bolts. Remove bob weight.

(6) Open STAB TRIM CONTROL, AUTO PILOT, and EMER & COCKPIT DOME LTS circuit breakers on main circuit breaker panel.

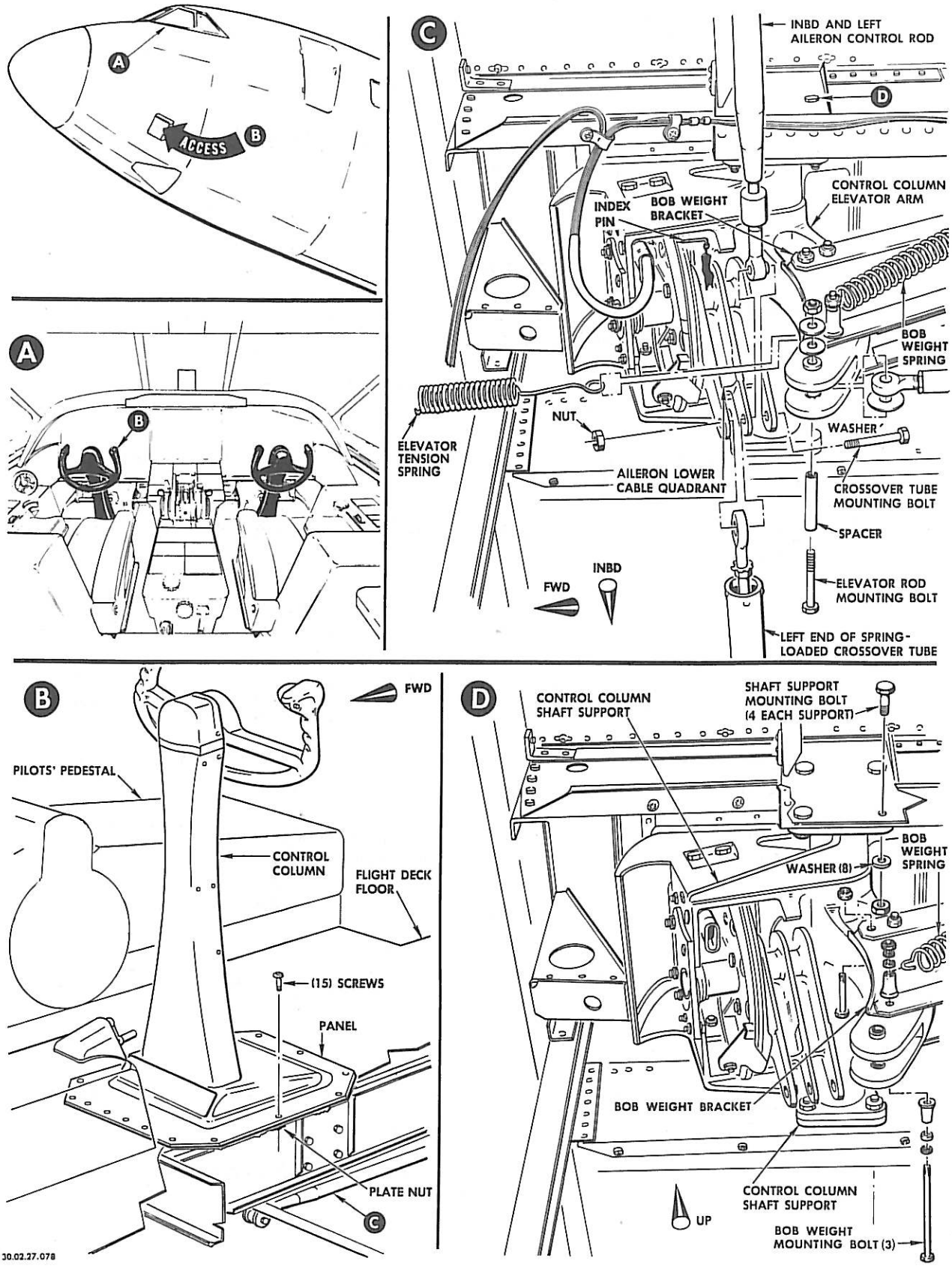
(7) Cut electrical wires to control column at permanent splices.

(8) Remove nuts from four bolts in each control column shaft support and slide bolts back through supports. Lift control column up through opening of flight compartment floor.

C. Install Elevator Control Column.

(1) Position elevator control column and install eight bolts attaching control column shaft supports to structure.

(2) Connect electrical wires (refer to Wiring Diagram Manual for information on permanent splices).


A
ACCESS
B
A
B
C
INBD AND LEFT AILERON CONTROL ROD
D
CONTROL COLUMN ELEVATOR ARM
INDEX PIN
BOB WEIGHT BRACKET
BOB WEIGHT SPRING
NUT
WASHER
ELEVATOR TENSION SPRING
AILERON LOWER CABLE QUADRANT
CROSSOVER TUBE MOUNTING BOLT
SPACER
INBD
FWD
ELEVATOR ROD MOUNTING BOLT
LEFT END OF SPRING-LOADED CROSSOVER TUBE
B
FWD
PILOTS' PEDESTAL
CONTROL COLUMN
FLIGHT DECK FLOOR
(15) SCREWS
PANEL
PLATE NUT
C
30.02.27.078
D
CONTROL COLUMN SHAFT SUPPORT
SHAFT SUPPORT MOUNTING BOLT (4 EACH SUPPORT)
BOB WEIGHT SPRING
WASHER (8)
BOB WEIGHT BRACKET
CONTROL COLUMN SHAFT SUPPORT
UP
BOB WEIGHT MOUNTING BOLT (3)

(3) Insert index pin 22-J107-2 in applicable elevator control forward "T" bell crank.

(4) Secure control column in neutral position. Determine control column neutral position by measuring distance between crack on top of control column where control column housing cover butts against housing and a point just above horizon flight direction indicator on instrument panel. Distance must measure 9.70 (±0.15) inches when control column is in neutral position. Measurement must be made with no force applied to either control column.

(5) Adjust length of elevator control rod between rigged elevator control "T" bell crank and control column elevator arm and connect forward end of control rod to control column elevator arm.

(6) Insert index pin 22-J107-2.5 in applicable aileron forward bell crank and index pin 22-J107-5.0 in control column lower cable quadrant.

(7) Adjust length of aileron control rod to rigged aileron crank and install inboard end of control rod on aft aileron crank.

(8) Insert index pin in opposite control column lower cable quadrant. Adjust length of forward spring-loaded crossover tube to rigged control column forward aileron cranks and connect end of crossover tube to control column forward aileron crank.

(9) Remove index pins from bell cranks and lower cable quadrants of both control columns.

(10) Check autopilot operation (refer to Chapter 22, AUTOPILOT).

(11) Check flight compartment dome light operation (refer to Chapter 33, LIGHTS).

(12) Check horizontal stabilizer operation (refer to 27-6-0, Adjustment/Test Stabilizer Trim System Functional Test).

NOTE: If a control column only has been replaced and no other rigging or adjustment has been changed, check stabilizer operation per 27-6-0, steps 3.G.(5), through 3.G.(8).

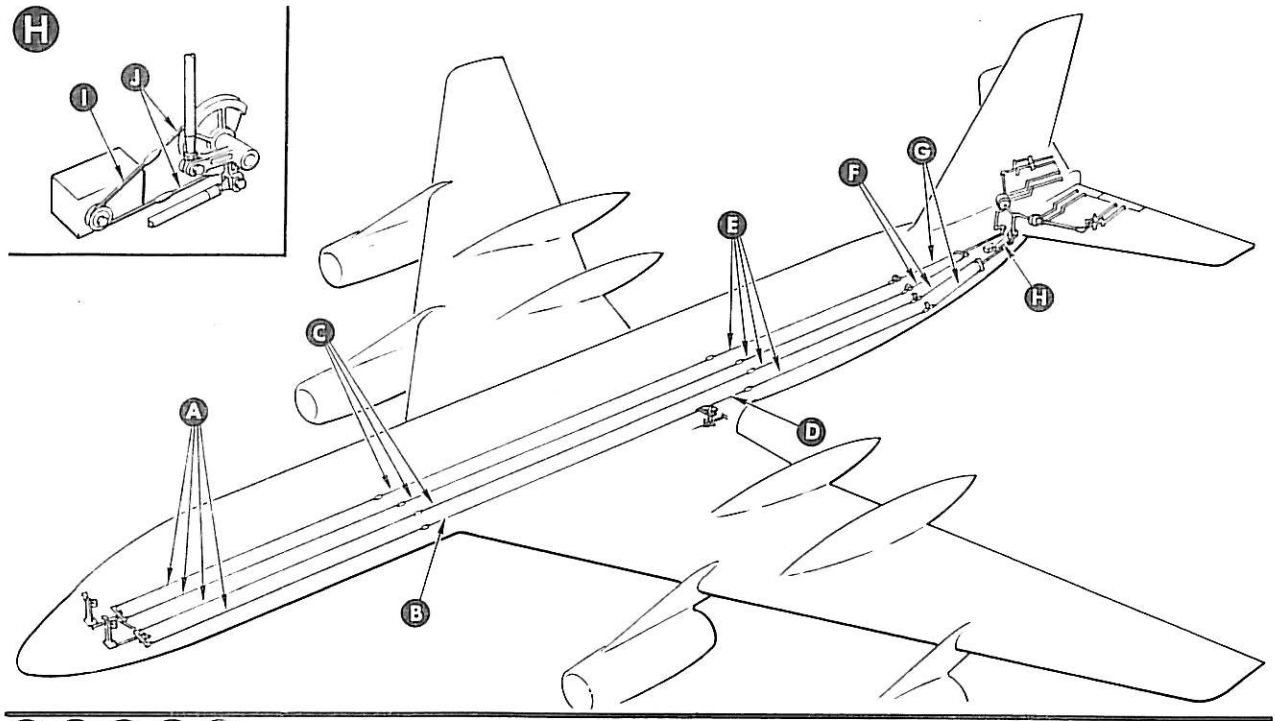
(13) Check aileron control system operation (refer to 27-1-0, Adjustment/Test Aileron System Functional Test).

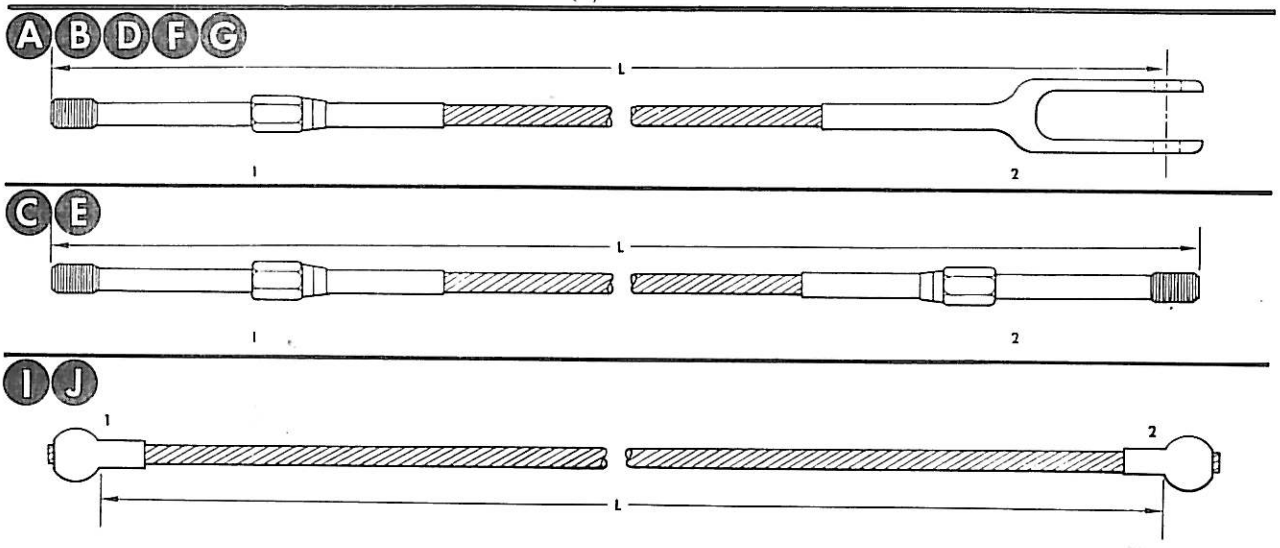
NOTE: If a control column only has been replaced and no other rigging or adjustment has been changed, check aileron operation per 27-1-0, steps 2.F.(2), 2.F.(3), 2.F.(5) and 2.F.(6).

(14) Check elevator control system operation (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

NOTE: If a control column only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, paragraph 2.I.

(15) Position panel surrounding control column and install screws.





CABLE REFERENCE	NUMBER REQUIRED	LENGTH	CABLE SIZE	FITTINGS 1	FITTINGS 2
A	4	383.10	1/8 X 1 X 19	NAS 650-L4RH	AN 658-4
B	1	362.90	1/8 X 1 X 19	NAS 650-L4LH	AN 658-4
C	3	447.70	1/8 X 1 X 19	NAS 650-L4RH	NAS 650-L4LH
D	1	81.20	1/8 X 1 X 19	NAS 650-L4RH	AN 658-4
E	4	312.20	1/8 X 1 X 19	NAS 650-L4RH	NAS 650-L4LH
F	2	117.85	1/8 X 1 X 19	NAS 650-L4LH	22-40914-7
G	2	124.15	1/8 X 1 X 19	NAS 650-L4RH	22-40914-9
I	1	21.12	1/8 X 7 X 19	AN 664C4	AN 664C4
J	2	11.75	1/8 X 7 X 19	AN 664C4	AN 664C4

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ELEVATOR STOPS - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Stops (Gust Dampers* or Elevator Stops**) (see Figure 201)

NOTE: Gust dampers or elevator stops are used to limit elevator travel. Removal/Installation is similar.

A. Equipment Required.

(1) Stand suitable for reaching elevators.

(2) Tool No. 30-00003-903 or -904, RGTL #1 to streamline elevator.

(3) Protractor 30-00003-901 or -902, RGTL #1 to measure elevator travel.

B. Remove Elevator Stops.

(1) Remove pressure board mechanism access panel.

(2) Remove curved access plate from forward edge of elevator.

(3) Deflect elevator and remove bolt to disconnect elevator stop shaft from "A" frame on leading edge of elevator.

(4) Disconnect aft ends of elevator stop struts from elevator leading edge.

(5) Remove four bolts to disconnect elevator stop support links from stabilizer spar.

(6) Shift elevator stop and spars forward, turn struts down and remove elevator stop and struts.

(7) Separate elevator stop and struts. Note number and total thickness of washers used on each side of elevator stop.

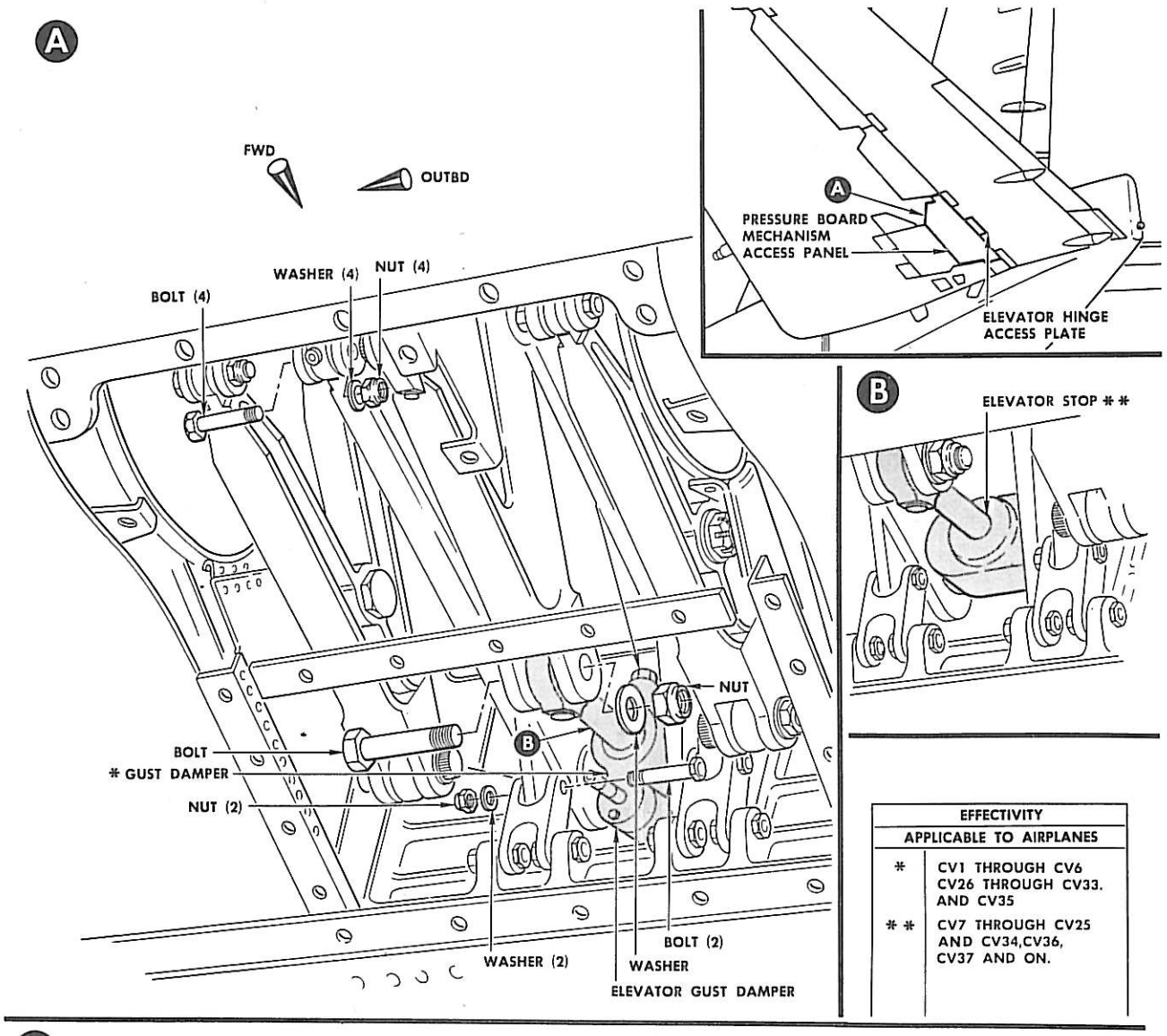
C. Install Elevator Stops.

(1) Install struts on elevator stop trunnion shafts. Make sure that proper number of washers are installed so that elevator stop support links will be aligned with stabilizer lugs.

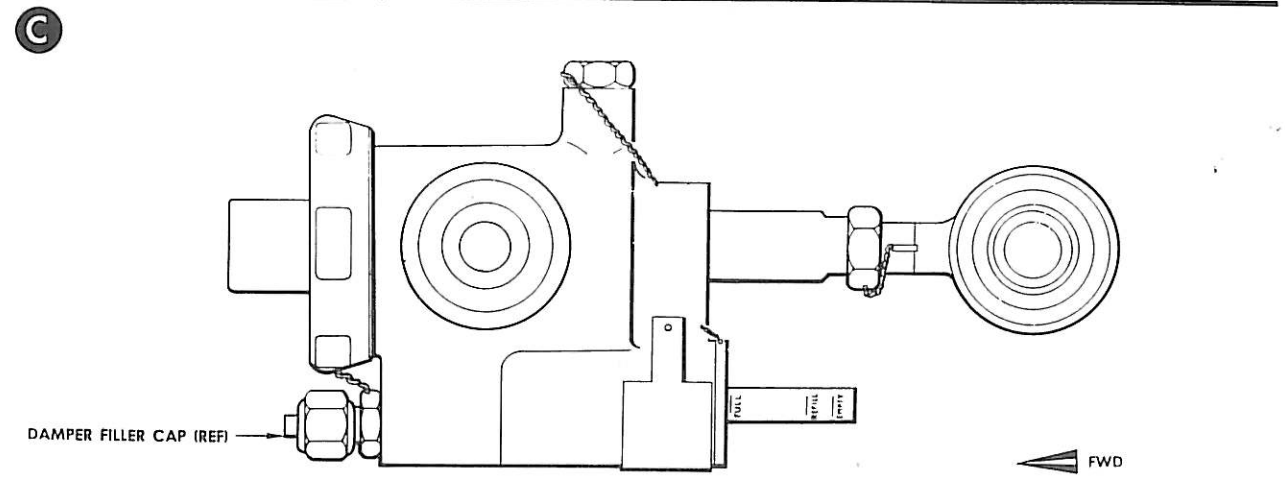
(2) Position elevator stop in trailing edge of stabilizer with struts in attaching lugs on elevator. Install four bolts to secure lower ends of support links to stabilizer spar.

(3) Secure aft ends of struts to elevator leading edge.

*Applicable to airplanes CV1 through CV6, CV26 through CV33, and CV35.
**Applicable to airplanes CV7 through CV25, CV34, CV36, CV37 and on.



EFFECTIVITY	
APPLICABLE TO AIRPLANES	
*	CV1 THROUGH CV6 CV26 THROUGH CV33. AND CV35
* *	CV7 THROUGH CV25 AND CV34,CV36, CV37 AND ON.



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Elevator Stop Installation
Figure 201

(4) Using stabilizer emergency trim handcrank, set stabilizer at 0-degree trim. Small hole in leading edge of stabilizer must be aligned with brazier head rivets in side of fuselage.

(5) Install tool 30-00003-903 or -904 RGTL #1 to secure elevator in streamline position.

(6) Attach protractor 30-00003-901 or -902, RGTL #1 to elevator trailing edge and set protractor at 0 (±0.50) degrees; then remove tool used to streamline elevator.

(7) Deflect elevator to a position 25 (+1.0, -0.5) degrees trailing edge up; then pull out elevator stop shaft until it bottoms.

(8) Adjust rod end of shaft until connecting bolt will slip through rod and bearing and "A" frame with elevator deflected 25 (+1.0, -0.5) degrees up.

(9) Deflect elevator trailing edge down. Deflection down shall be 12 (+1.0, -0.5) degrees. Readjust elevator stop shaft rod end as required to obtain specified down deflection while keeping elevator up deflection within 25 (+1.0, -0.5) degree limits.

(10) Test system (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

NOTE: If an elevator stop or gust damper only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, paragraph 2.F.

(11) Install access panel and plate, remove tool from trailing edge of elevator, and return airplane to normal configuration.

2. Adjustment/Test Gust Damper Unit Servicing - Applicable to Airplanes CV1 Throught CV6, CV26 Through CV33, and CV35 (see Figure 201)

A. Equipment Required.

(1) Stand suitable to gain access to lower surface of elevator.

(2) Hydraulic fluid pressure pot with a minimum capacity of one gallon and incorporating the following components:

(a) 1/4-inch fluid port at bottom of pot.

(b) Fitting to connect source of air pressure to pot.

(c) Ten feet of 1/4-inch hose to connect pressure pot to damper (hose to incorporate shutoff valve in vicinity of damper connection).

(d) Pressure gage graduated from 0 to 100 psig.

(3) Source of 50 psig dry filtered air.

(4) Hydraulic fluid, Specification MIL-H-5606, filtered to 10 microns.

B. Procedure.

(1) Add hydraulic fluid, and pressurize pot to 50 psig.

(2) Remove GUST DAMPER access panel from lower surface of horizontal stabilizer.

(3) Remove cap from gust damper filler valve.

(4) Open pressure pot control valve slightly, allowing a few drops of fluid to run from end of hose.

(5) When hose is filled with fluid, connect hose to damper filler valve finger tight.

NOTE: Hose is connected to damper only finger tight in order to allow air remaining in hose to escape when control valve is opened.

(6) Open control valve slightly until fluid drips from loose connection at damper.

(7) Tighten hose fitting at damper.

(8) Continue opening control valve and observe damper reservoir fluid lever indicator.

(9) When full mark is visible, close control valve and disconnect hose from damper.

(10) Install filler valve cap and safety.

(11) Remove servicing equipment.

(12) Wipe any spilled hydraulic fluid from airplane structure and install GUST DAMPER access panel.

ELEVATOR FLUTTER DAMPERS - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Inboard Flutter Damper (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching elevators.

(2) Deleted.

(3) Tool 30-00003-903, or -904, RGTL #1 to secure elevator in neutral position.

(4) Protractor 30-00003-901 RGTL #2 for measuring tab travel.

(5) Spring scale calibrated in tenths of a pound.

(6) Index pin 22-J107-2.0 to rig elevator flight tab bell crank.

(7) Index pin 22-J107-3.25 to rig elevator inboard bell crank.

(8) External source of hydraulic power (for use only if flaps are not in "full down" position).

B. Remove Elevator Inboard Flutter Damper.

(1) Check that flaps are in "full down" position. If not, lower flaps (refer to Removal/Installation Elevator, Paragraph 1.C. Step (1)).

NOTE: When flaps are fully extended, elevator downspring exerts negligible force on elevator control system.

(2) Deleted.

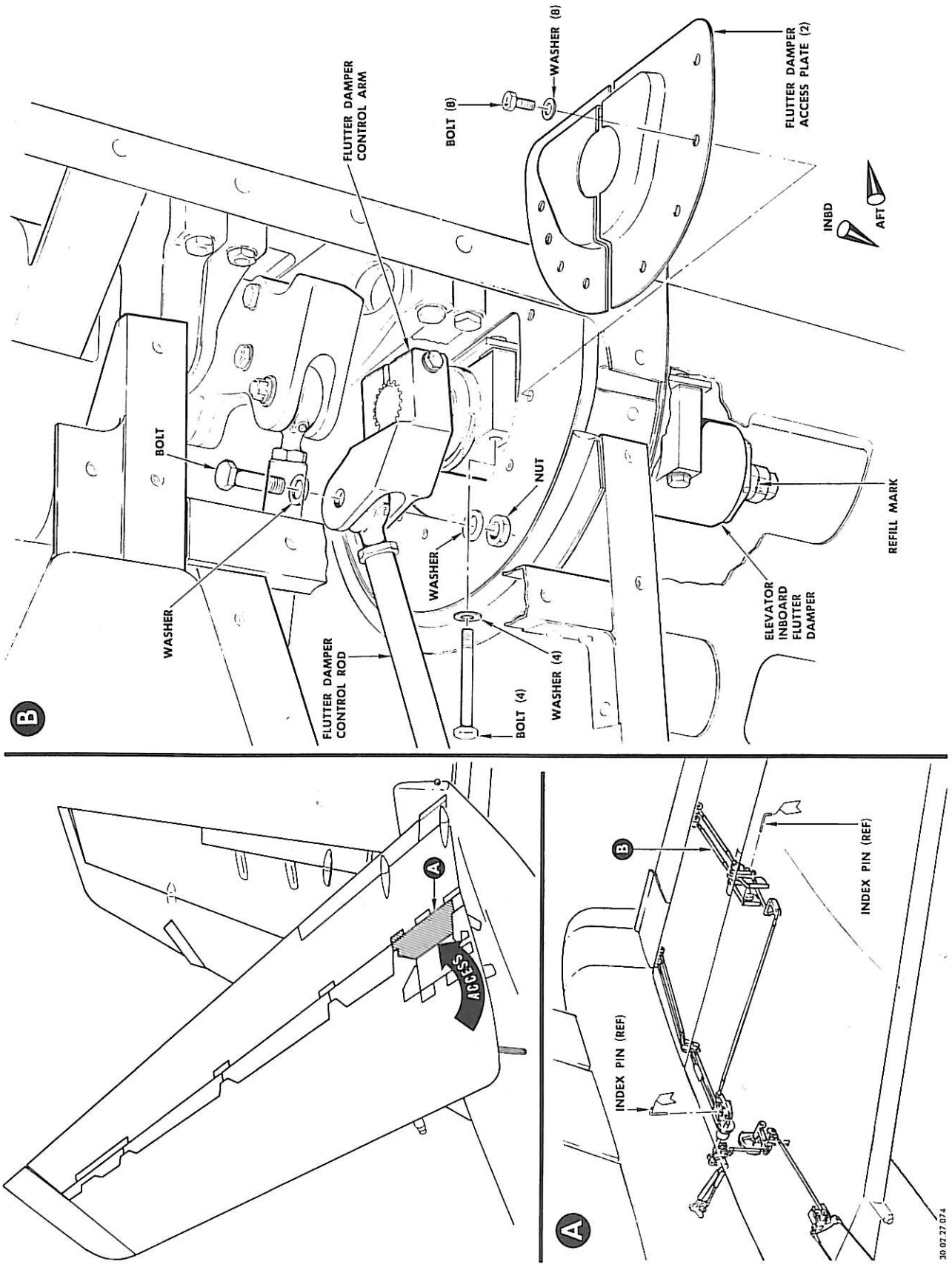
(3) Remove elevator pressure board mechanism access panel and elevator hinge access plate from top and bottom of stabilizer.

(4) Remove access panel outboard of and adjacent to pressure board access panel.

(5) Remove elevator inboard bell crank access panel.

(6) Remove flight tab bell crank, (refer to Removal/Installation Elevator Flight Tab Bell Crank). Do not disassemble bell crank and mounting brackets.

(7) Remove both halves of semi-circular access panel from inboard side of bell crank mounting area.



Elevator Inboard Flutter Damper
Installation
Figure 201

(8) Disconnect forward end of flutter Damper control rod by removing nuts attaching flutter damper control rod bracket to stabilizer spar. Nuts are accessible through access opening outboard of and adjacent to pressure board access panel.

(9) Remove flutter damper mounting bolts and remove flutter damper. Two inboard mounting bolts are accessible through small access openings in leading edge of elevator.

NOTE: Note location of spacers (if spacers are used) between flutter damper and elevator spar.

(10) Remove bolt from large end of flutter damper arm and remove arm from flutter damper shaft. Separate flutter damper arm and control rod. Do not separate control rod and bracket.

C. Install Elevator Inboard Flutter Damper.

(1) Install arm on flutter damper shaft. Make sure that index marks on arm and tip of indexed spline on shaft are aligned.

(2) Position flutter damper on elevator leading edge spar and install four mounting bolts. Install spacers as noted in step B. (9).

(3) Check operation of flutter damper as follows:

(a) Attach spring scale to forward end of flutter damper arm. Measure distance from center of damper shaft to scale attach point.

(b) Pull scale at a slow and steady rate in direction of normal arm rotation. Keep scale at 90 degrees to damper arm at all times.

(c) Multiply breakout force measured in pounds by number of inches obtained in step (a). Breakout force shall not exceed 10 inch-pounds.

(d) If breakout force is greater than 10 inch-pounds install spacers as necessary between flutter damper and elevator spar to prevent torquing of flutter damper.

(4) Install tool 30-00003-903 LH, or -904 RH, RGTL #1 to secure elevator in streamline position (see 27-5-0, Figure 203).

(5) Install protractor 30-00003-901 RGTL #2 and maintain flight tab in streamline position (see 27-5-0, Figure 203).

(6) Insert index pin through elevator inboard bell crank.

(7) Install flight tab bell crank (refer to Removal/Installation Elevator Flight Tab Bell Crank).

(8) Adjust control rod to a length of 11.16 inches, measured between centers of rod end bearings, and install bracket connected to one end of rod on stabilizer spar; connect other end to flutter damper arm.

(9) Remove index pins from elevator inboard bell crank and flight tab bell crank.

(10) Remove tab protractor and tool securing elevator in neutral position.

(11) Check elevator control system operation (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

NOTE: If an elevator inboard flutter damper only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, paragraph 2.F.

(12) Install all access panels and return airplane to normal configuration.

2. Removal/Installation Elevator Outboard Flutter Dampers (see Figure 202)

A. Equipment Required.

(1) Stand suitable for reaching elevators.

(2) Tool 30-00003-903, or -904, RGTL #1 to secure elevator in streamline position.

(3) Spring scale calibrated in tenths of a pound.

B. Remove Elevator Outboard Flutter Damper.

(1) Install tool 30-00003-903, or -904, RGTL #1 to secure elevator in streamline position.

(2) Remove outboard balance weight access door and outboard elevator hinge access plate.

(3) Disconnect short link from arm on flutter damper.

(4) Remove arm from flutter damper (inboard flutter damper only).

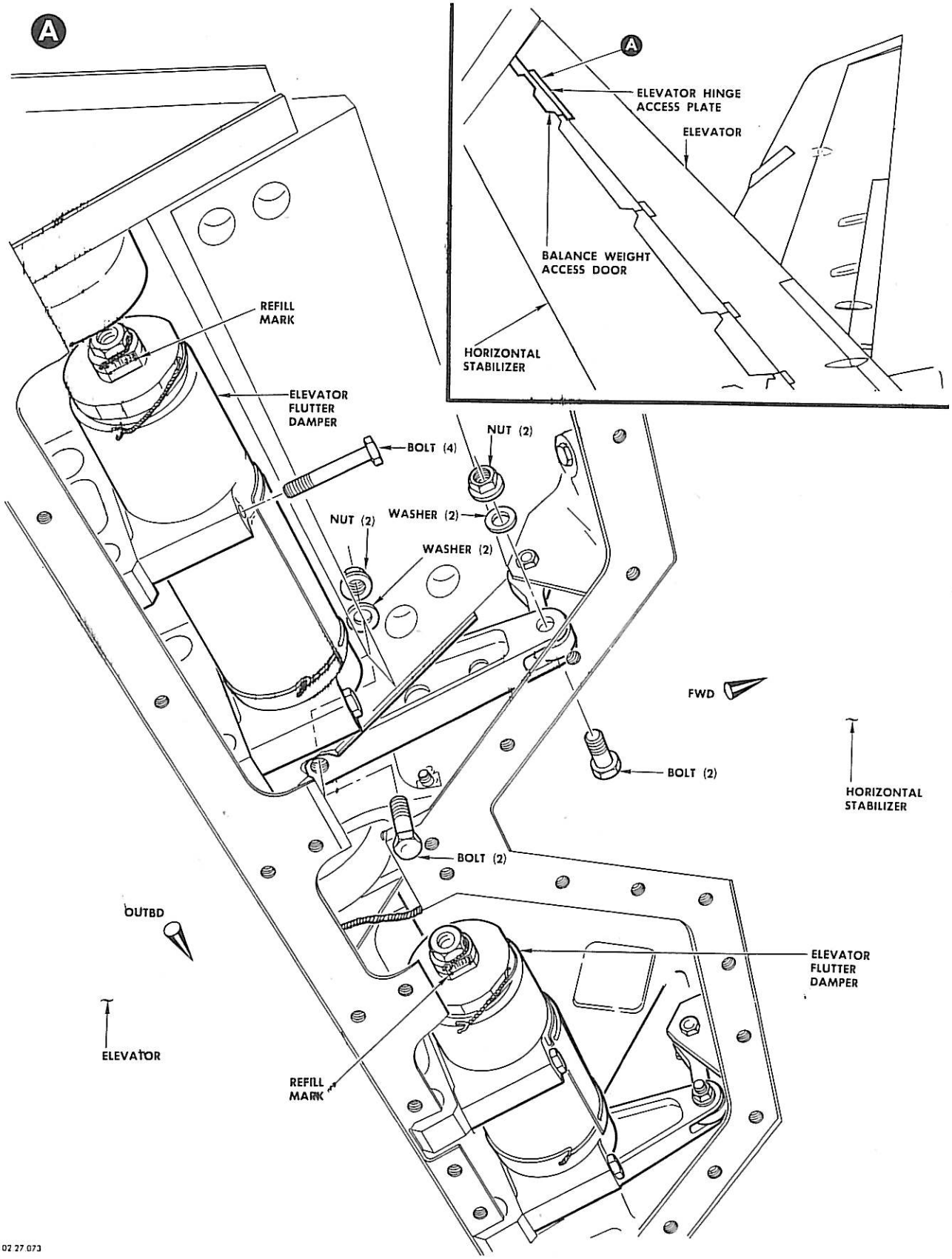
(5) Remove four bolts retaining damper on elevator spar and remove flutter damper.

NOTE: Note location of spacers between flutter damper and elevator spar (if spacers are used).

C. Install Elevator Outboard Flutter Damper.

(1) Position flutter damper on elevator spar with spacers installed as noted in step B. (5). Install flutter damper mounting bolts.

(2) With flutter damper securely mounted on elevator spar, check flutter damper operation (refer to Removal/Installation Elevator Inboard Flutter Damper).



Elevator Outboard Flutter Damper Installation
Figure 202

(3) Install arm on flutter damper (inboard flutter damper only).

NOTE: Index mark on arm must align with tip of indexed spline on flutter damper shaft.

(4) Connect flutter damper arm to short link on stabilizer spar.

(5) Remove tool securing elevator in streamline position.

(6) Check elevator control system operation (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

NOTE: If an elevator outboard flutter damper only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, paragraph 2.F.

(7) Install access panels and plates and return airplane to normal configuration.

3. Adjustment/Test Unit Servicing

A. General.

Flutter dampers should not be serviced while on the airplane. When the refill line on the fluid level indicator disappears from view, the unit should be removed and a serviceable flutter damper installed.

ELEVATOR FLIGHT TAB FLUTTER DAMPERS - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Flight Tab Flutter Dampers (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching elevators.

(2) Tool 30-00003-903, or -904 RGTL #1 to secure elevator in streamline position and protractor 30-00003-901 RGTL #2 to maintain elevator flight tab in streamline position.

(3) Spring Scale calibrated in tenths of a pound.

B. Remove Elevator Flight Tab Flutter Dampers.

(1) Check that flaps are in "full down" position. If not, lower flaps (refer to Removal/Installation Elevator, Paragraph 1.C., Step (1)).

NOTE: When flaps are fully extended, elevator downspring exerts negligible force on elevator control system.

(2) Remove pressure board mechanism access doors from upper and lower sides of stabilizer.

(3) Remove elevator hinge access plate at second hinge from inboard end of elevator.

(4) Disconnect control rod from elevator flight tab bell crank.

(5) Remove four bolts attaching flutter damper mounting bracket to stabilizer spar. Remove flutter damper and mounting bracket.

(6) Remove flutter damper from mounting bracket.

NOTE: Note location of spacers (if used) between flutter damper and mounting bracket.

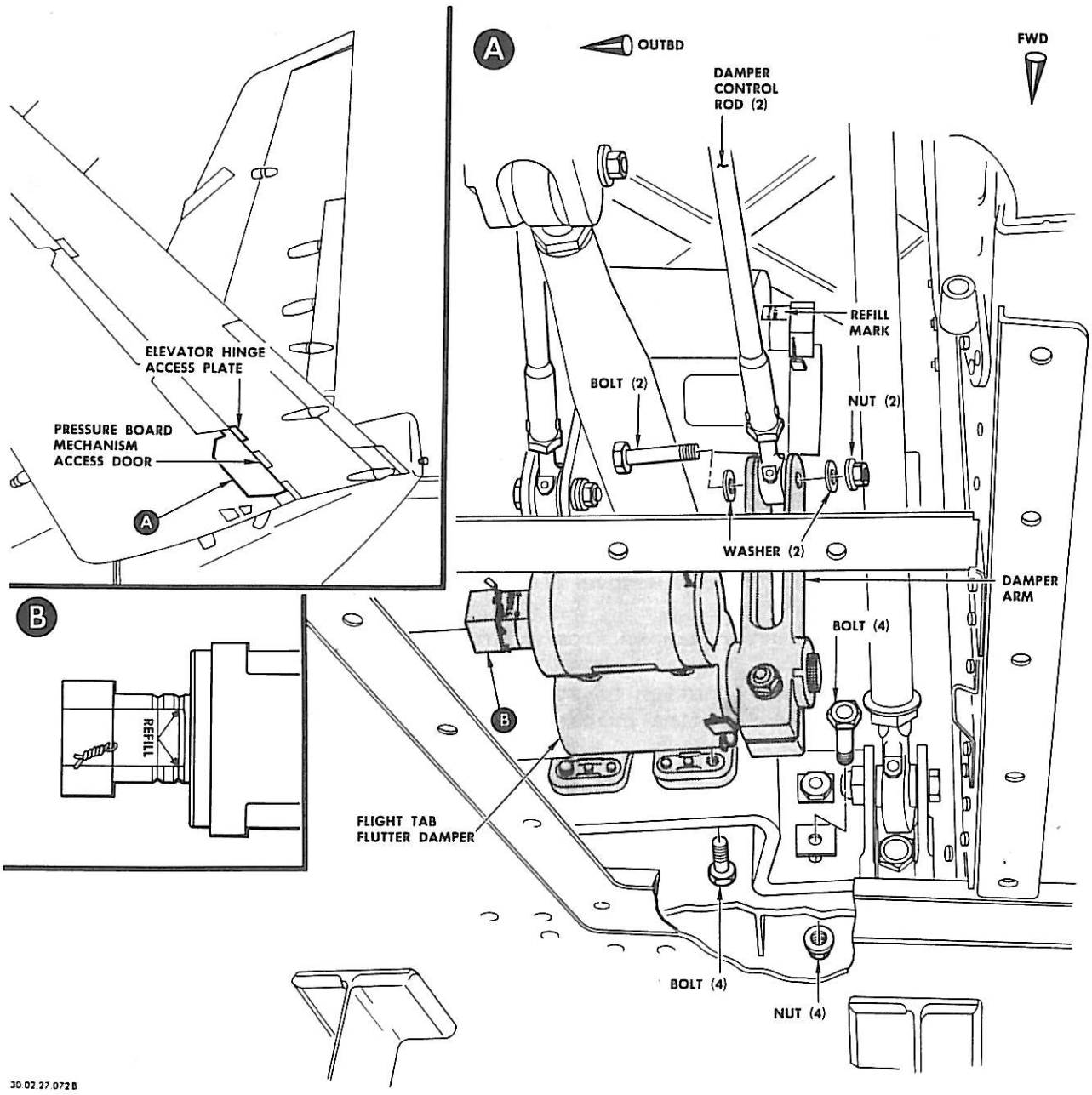
C. Install Elevator Flight Tab Flutter Damper.

(1) Install flutter damper on mounting bracket. Install spacers as noted in step B. (6).

(2) Position flutter damper and bracket on stabilizer spar and install four mounting bolts.

(3) Check operation of flutter damper as follows:

(a) Attach spring scale to forward end of flutter damper arm. Measure distance from center of damper shaft to scale attach point.



Elevator Flight Tab Flutter
Damper Installation
Figure 201

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 27-103

Insert facing 27-5-8, Page 202, dated June 15/64 (or subsequent).

This temporary revision is applicable to airplanes not incorporating Lionel Pacific Service Bulletin No. 27-001.

For airplanes incorporating Lionel Pacific Service Bulletin No. 27-001, use the information on Page 202.

Page 202, delete view B and check damper fluid level as follows:

> Measure the distance between reservoir body and surface of plunger end cap nearest reservoir body. If dimension measured is 0.45 inch or greater, damper may continue in service. (Use of a Go-No-Go gage or inside calipers of 0.45 inch width is recommended.)
>
> If the distance, as measured above, is less than 0.45 inch, remove and refill damper.

(b) Pull sclae at a slow and steady rate in direction of normal arm rotation. Keep scale at 90 degrees to damper arm at all times.

(c) Multiply breakout force measured in pounds by the number of inches obtained in step (a). This breakout force shall not exceed three and one-tenth inch-pounds.

(d) If breakout force is greater than three and one-tenth inch-pounds, install shims as necessary between flutter damper and mounting bracket to prevent torquing of flutter damper.

(4) Install tool 30-00003-903 or -904, RGTL #1 to secure elevator in streamline position (see 27-5-0, Figure 203).

(5) Install protractor 30-00003-901 RGTL #2 (see 27-5-0, Figure 203) and maintain elevator flight tab in streamline position.

(6) Connect control rod between rigged flight tab bell crank and flutter damper.

(7) Check elevator control system operation (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

NOTE: If an elevator flight tab flutter damper only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, steps 2.E.(1) through 2.E.(10).

(8) Remove rigging tools, install access panels and plates, and return airplane to normal configuration.

2. Adjustment/Test Unit Servicing

A. General.

Flutter dampers should not be serviced while on the airplane. When the refill line on the fluid level indicator disappears from view, the unit should be removed and a serviceable flutter damper installed.

ELEVATOR CONTROL FORWARD "T" BELL CRANKS - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Forward "T" Bell Cranks (see Figure 201)

   A. Equipment Required.

      (1) Stand suitable for reaching nose section door.

      (2) Index pins 22-J107-2.0 and 22-J107-6.0 or equivalent.

      (3) Specially calibrated cable tensiometer for measuring tension of 1/8 inch 1 x 19 nonflex cable.

   B. Remove Forward "T" Bell Crank.

      (1) Disconnect aft end of push-pull rod connecting "T" bell crank to control column elevator arm.

      (2) Disconnect forward spring-loaded crossover tube from "T" bell crank arm.

      (3) Loosen turnbuckle in elevator control cable located in forward cargo compartment at fuselage station 627 and disconnect elevator cable clevises from "T" bell crank cable arms.

      (4) Remove four bolts attaching bell crank support to "T" bell crank forward and aft brackets.

      (5) Remove nuts from two bolts attaching "T" bell crank upper bearing retainer to flight deck floor and bell crank lower assembly.

      (6) Remove two bolts attaching "T" bell crank lower bearing retainer to bell crank support and remove support.

   C. Install Forward "T" Bell Crank.

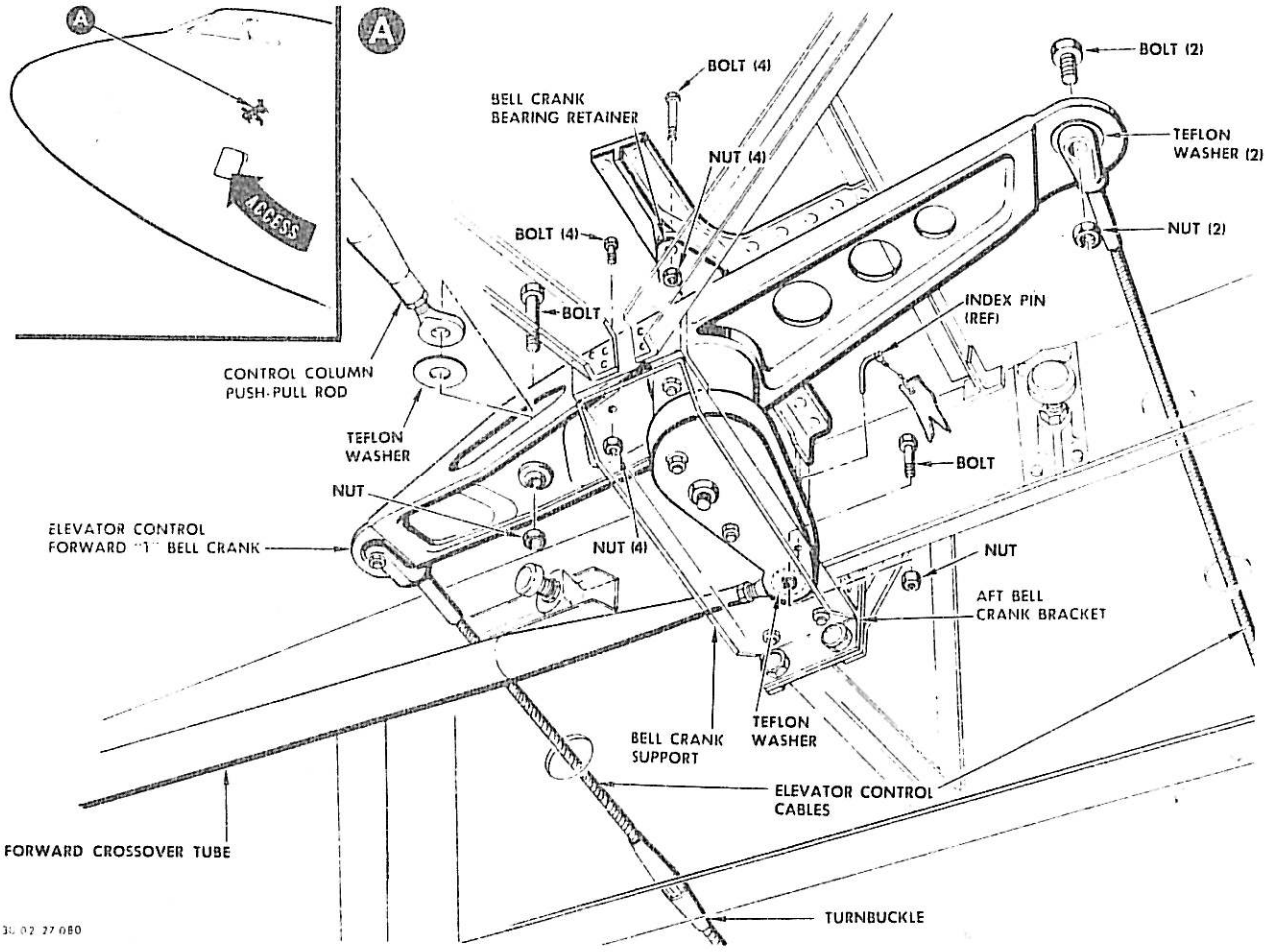
      (1) Install two bolts attaching "T" bell crank lower bearing retainer to bell crank support.

      (2) Position forward "T" bell crank on two bolts attaching "T" bell crank assembly to flight deck floor and install two nuts.

      (3) Install four bolts attaching "T" bell crank lower support to forward and aft brackets.

      (4) Attach elevator cable clevises to bell crank cable arms.

      (5) Tighten turnbuckle loosened in step B. (3) to obtain a cable tension of 205 (±25) pounds at 70 degrees F (21 degrees C). Increase or decrease cable tension 1.0 pound for each degree F (2.0 pounds for each degree C) increase or decrease respectively in free air temperature.



Elevator Control Forward
"T" Bell Crank Installation
Figure 201

(6) Insert index pin 22-J107-2.0 in aft "T" bell crank and adjust turnbuckles until index pin 22-J107-2.0 can be inserted in forward "T" bell crank. Recheck cable tension and safety turnbuckles with NAS 651 clips.

(7) Position aft end of elevator push-pull rod on bell crank inboard arm and install bolt.

(8) Insert index pin 22-J107-2.0 in opposite forward "T" bell crank. Adjust length of spring-loaded crossover tube to rigged "T" bell cranks and install tube between forward and aft arms of "T" bell cranks.

(9) Remove index pins from forward and aft "T" bell cranks.

(10) Test system (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

NOTE: If an elevator control forward bell crank only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, steps 2.E.(5), 2.E.(6) and 2.I.(10) through 2.I.(16).

(11) Return airplane to normal configuration.

ELEVATOR CONTROL AFT "T" BELL CRANKS - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Aft "T" Bell Cranks (see Figure 201)

A. Equipment Required.

(1) Stand suitable for entering tail cone access doors.

(2) Index pins as follows:

Two 22-J107-2.5 to rig idler bell cranks.

One 22-J107-2.0 to rig aft bell crank.

One 22-J107-6.0 to rig elevator upper bell crank.

(3) External source of hydraulic power (for use only if flaps are not fully extended).

(4) Specially calibrated cable tensiometer for measuring tension of 1/8-inch 1 x 19 nonflex cable.

B. Remove Elevator Aft "T" Bell Crank.

(1) Check that flaps are in "full down" position. If not, lower flaps (refer to Removal/Installation Elevator, Paragraph 1.C. Step (1)).

NOTE: Elevator downspring exerts negligible force on elevator control system when flaps are fully extended.

(2) Open tail cone access doors.

(3) Remove nuts from bolts used to connect control cables to aft "T" bell crank.

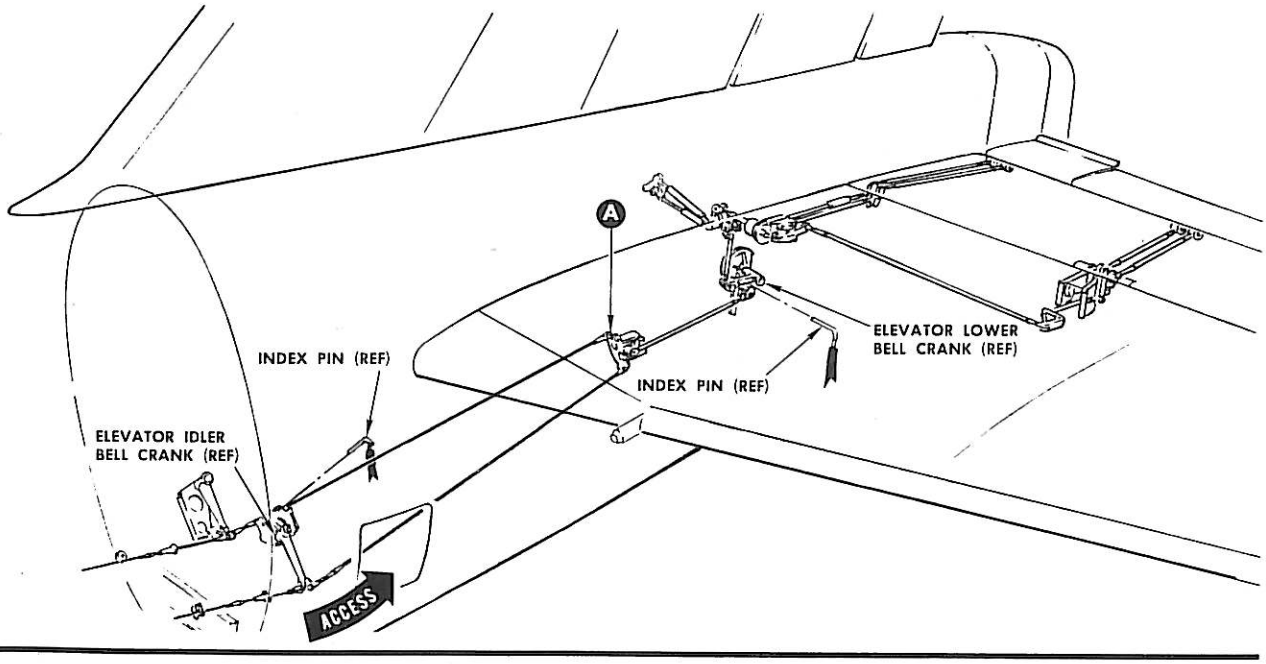
(4) Loosen turnbuckle just aft of idler bell crank until bolts can be easily removed.

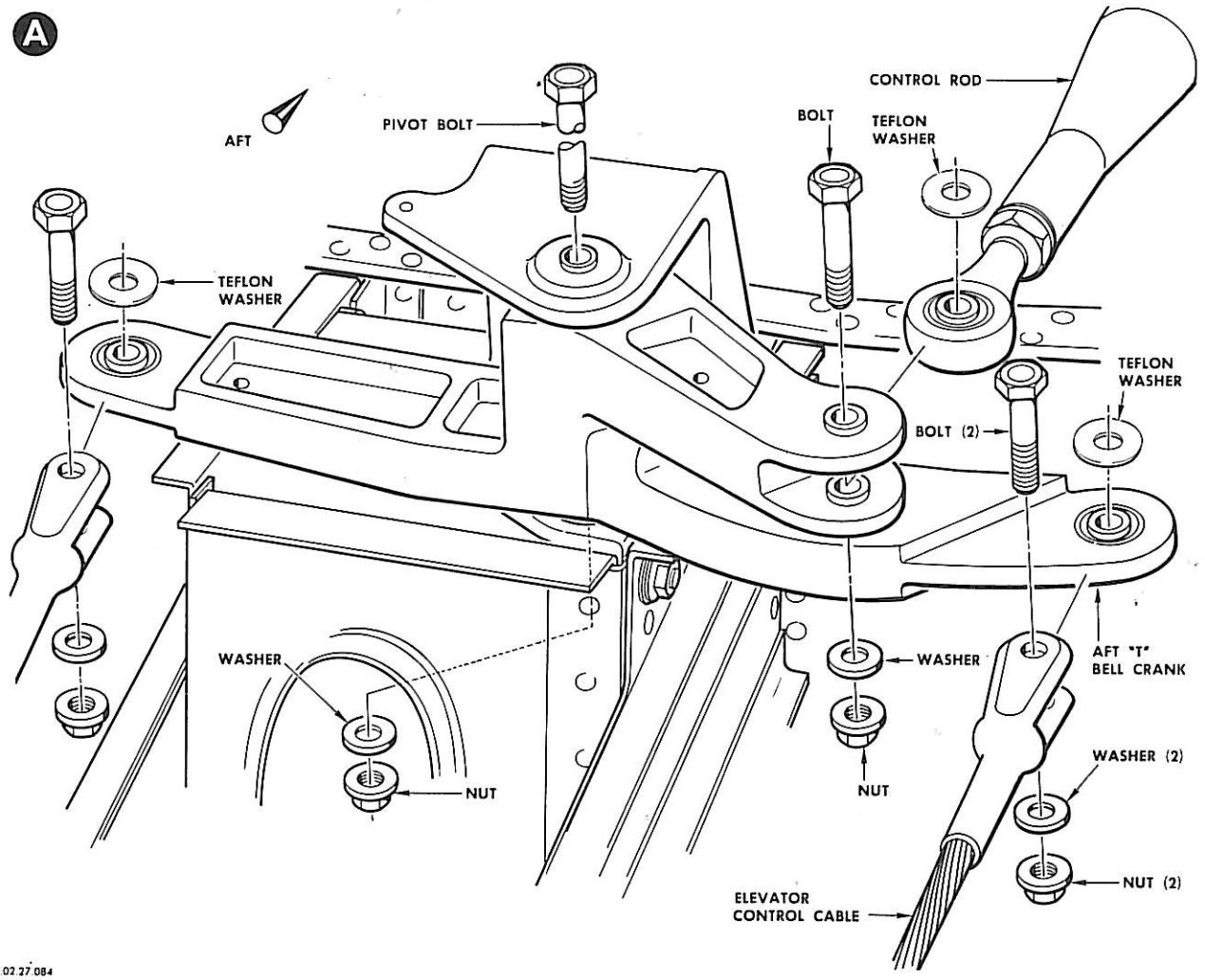
(5) Disconnect control rod from bell crank.

(6) Remove bell crank pivot bolt and remove aft "T" bell crank.

C. Install Elevator Aft "T" Bell Crank.

NOTE: Prior to installing aft "T" bell crank, check bearings in bell crank two-bearing assembly for evidence of binding on bolt, ratcheting, or excessive wear. Replace defective bearings (refer to 27-0, Bell Crank Bearing Installation - Typical).





Elevator Control Aft
"T" Bell Crank Installation
Figure 201

(1) Position aft "T" bell crank in airplane and install pivot bolt.

(2) Connect elevator control cables to "T" bell crank.

(3) Adjust tension of cables to 205 (±25) pounds at 70 degrees F (21 degrees C). Increase or decrease specified cable tension 1 pound for each degree F (2 pounds for each degree C) increase or decrease respectively in free air temperature.

(4) Insert index pin 22-J107-2.0 through elevator forward "T" bell crank.

(5) Adjust cable turnbuckles until index pin 22-J107-2.0 can be inserted through aft "T" bell crank. Recheck cable tension and safety turnbuckles with NAS 651 clip.

(6) Insert index pin 22-J107-6.0 through elevator upper bell crank.

(7) Adjust flight tab control rod as necessary to connect to rigged aft "T" bell crank with upper bell crank rigged.

(8) Remove index pins and test system (refer to 27-5-0 Adjustment/Test Elevator Control System Functional Test).

NOTE: If an elevator aft "T" bell crank only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, steps 2.E.(5), 2.E.(6) and 2.I.(10) through 2.I.(16).

(9) Close access doors and return airplane to normal configuration.

ELEVATOR CONTROL LOWER BELL CRANK - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Lower Bell Crank

A. General.

Removal and installation instructions for the elevator control lower bell crank are the same as for the elevator control servo quadrant bell crank except that instructions applying to control cables do not apply to the elevator control lower bell crank. Refer to Removal/Installation Elevator Control Servo Quadrant for removal and installation instructions.

TEMPORARY REVISION NO. 27-47.

Insert facing 27-5-12, Page 201, dated Feb. 15/63 (or subsequent).

The instructions in this temporary revision are to be used for airplanes not modified per Service Bulletin No. 27-43B.

For airplanes that have been modified per Service Bulletin No. 27-43B use the instructions beginning on 27-5-12, Page 201.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

Page 201, delete steps B.(4) and C.(3) and substitute the following:

B.(4) Disconnect LH end of centering and feel spring from beam bracket.

C.(3) Install centering and feel spring and tighten lock nut on rod end.

NOTE: Centering and feel spring drain holes must be on lower side of cartridge.

ELEVATOR FLIGHT TAB CENTERING AND FEEL SPRING - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Flight Tab Centering and Feel Spring (see Figure 201)

   A. Equipment Required.

      (1) Stand suitable for reaching tail cone aft access door.

      (2) Index pin 22-J107-6 to rig elevator RH upper bell crank.

   B. Remove Elevator Flight Tab Center and Feel Spring.

      (1) Check that flaps are in "full down" position. If not, lower flaps (refer to Removal/Installation Elevator, Paragraph 1.C. Step (1)).

         NOTE: When flaps are fully extended, elevator downspring exerts negligible force on elevator flight tab control system.

      (2) Open tail cone aft access door.

      (3) Disconnect centering and feel spring from elevator RH upper bell crank.

      (4) Disconnect centering and feel spring from bracket and remove spring.

   C. Install Elevator Flight Tab Centering and Feel Spring.

      (1) Insert index pin 22-J107-6.0 through elevator RH upper bell crank.

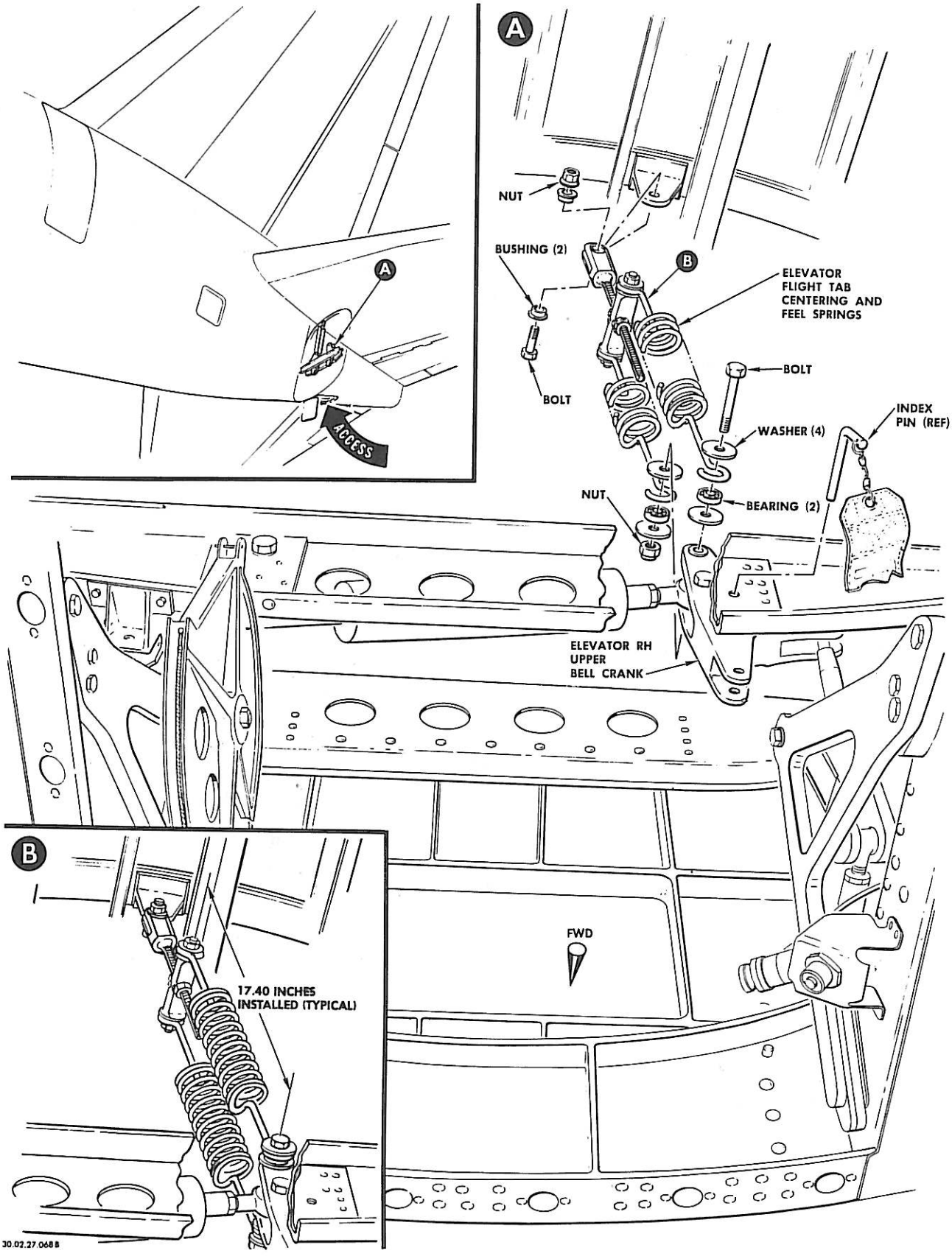
      (2) Install centering and feel spring between rigged RH upper bell crank and bulkhead bracket.

      (3) Adjust length of individual springs to a distance of 17.40 inches between centers of spring attach bolt holes.

      (4) Remove index pin from RH upper bell crank and check operation of flight tab centering and feel spring. Determine control column neutral position by measuring distance between crack on top of control column where control column housing cover butts against housing and a point just above the horizon flight director indicator on instrument panel. Distance must measure 9.70 (±0.15) inches. Measurement must be made with no force applied to either control column.

      (5) Move control column to full forward position and release. Column should return to a position 3.0 (±1.0) inches forward of neutral.

      (6) Move control column to full aft position and release. Column should return to a position 1.0 (±1.0) inch forward of neutral.



Elevator Flight Tab Centering and Feel Spring Installation
Figure 201

CONVAIR MODEL 30

MAINTENANCE MANUAL

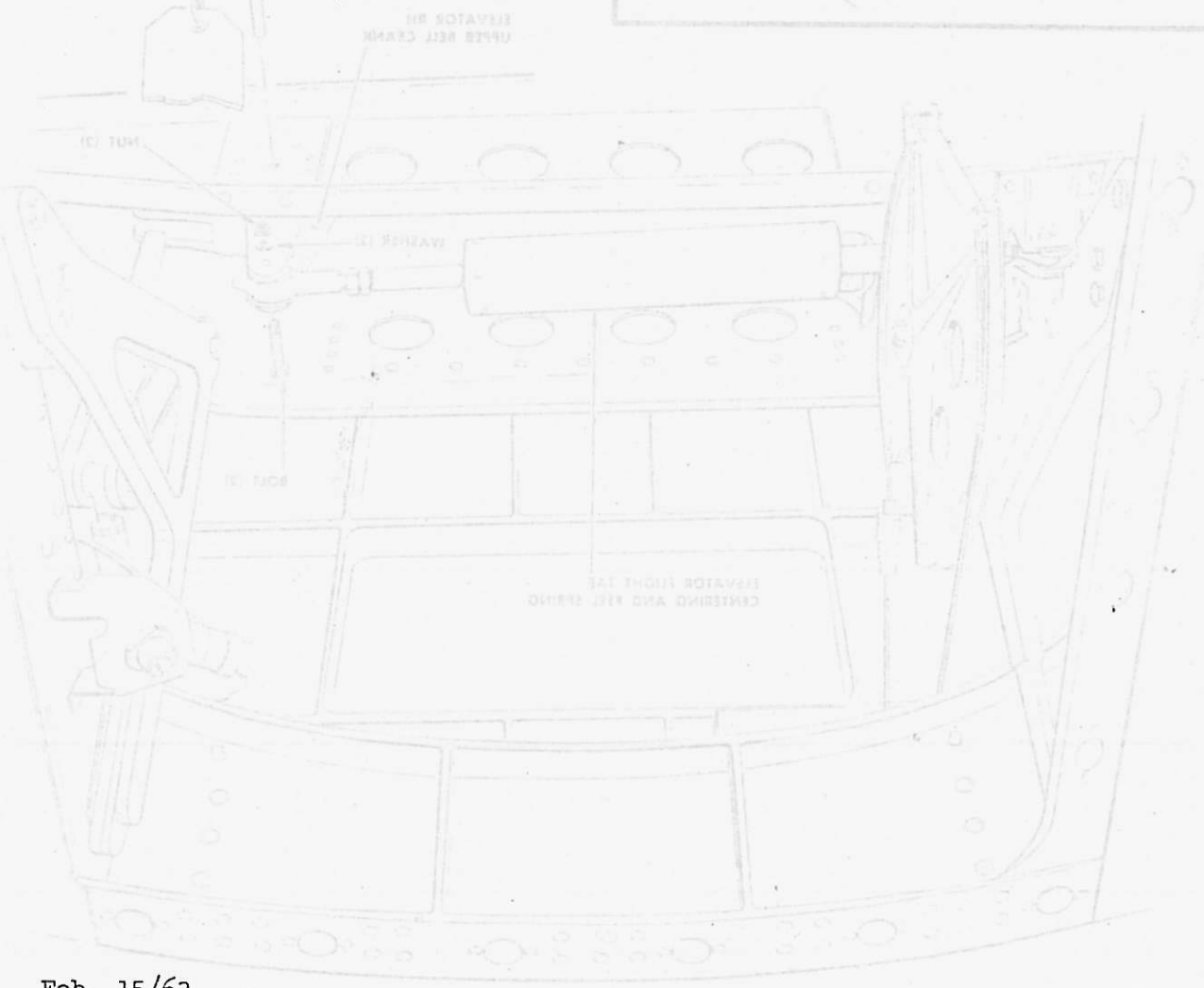
TEMPORARY REVISION NO. 27-48.

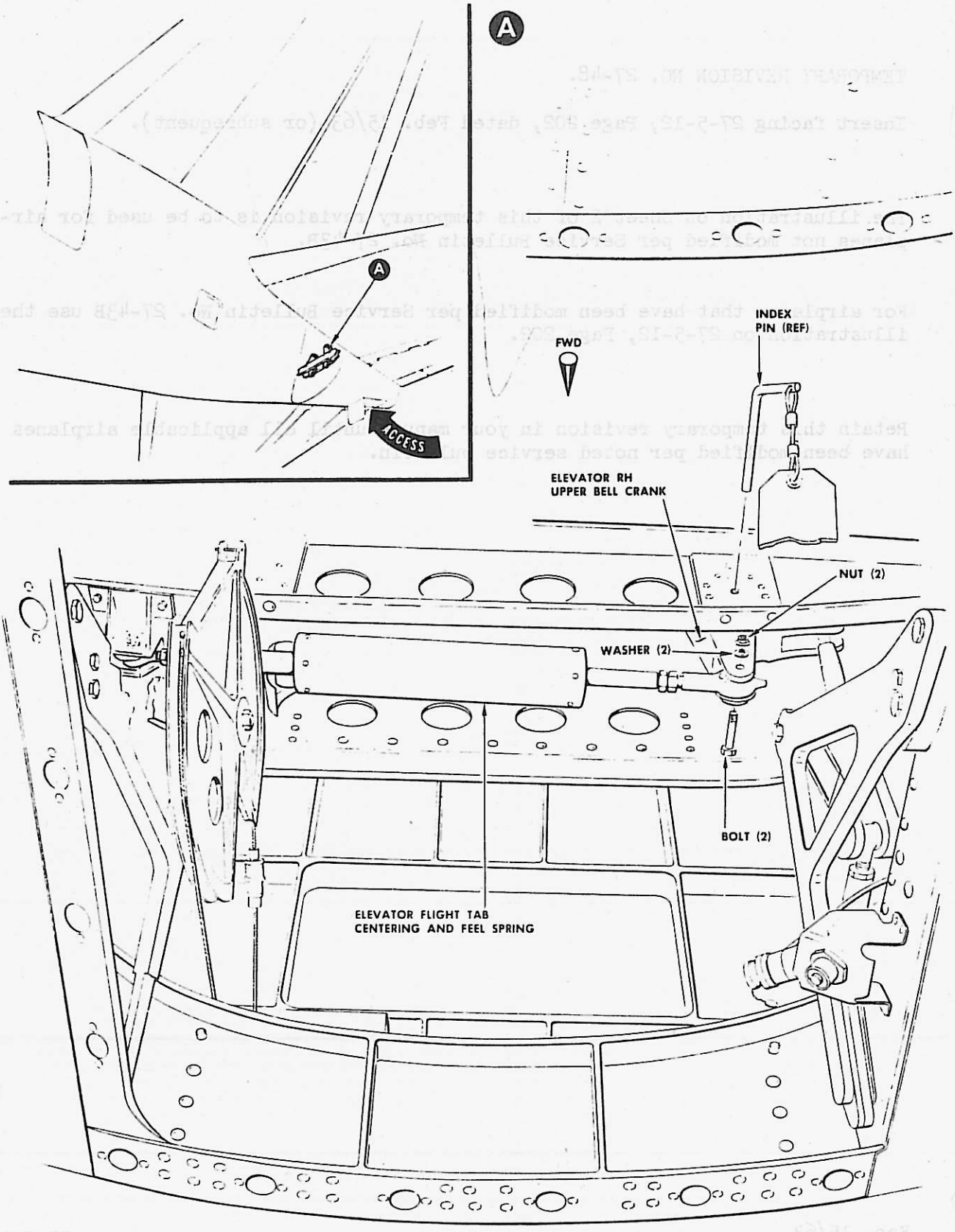
Insert facing 27-5-12, Page 202, dated Feb. 15/63 (or subsequent).

The illustration on Sheet 2 of this temporary revision is to be used for airplanes not modified per Service Bulletin No. 27-43B.

For airplanes that have been modified per Service Bulletin No. 27-43B use the illustration on 27-5-12, Page 202.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.





Elevator Flight Tab Centering and Feel Spring Installation
Figure 201

(7) Check elevator system operation (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

NOTE: If an elevator centering and feel spring only has been changed and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, paragraph 2.I.

(8) Close tail cone access door and return airplane to normal configution.

ELEVATOR CONTROL IDLER BELL CRANKS - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Control Idler Bell Cranks (see Figure 201)

A. Equipment Required.

(1) Stand suitable for entering tail cone forward access door.

(2) Index pins as follows:

22-J107-2.0 (1) to rig aft "T" bell crank.
22-J107-2.5 (2) to rig idler bell cranks.
22-J107-3.0 (1) to rig forward "T" bell crank.

(3) Specially calibrated cable tensiometer for measuring tension of nonflex control cables.

B. Remove Elevator Control Idler Bell Crank.

(1) Check that flaps are in "full-down" position. If not, lower flaps (refer to Removal/Installation Elevator, Paragraph 1.C., Step (1)).

NOTE: When flaps are fully extended, elevator downspring exerts a negligible load on elevator control system.

(2) Open tail cone forward access door.

(3) Insert index pin 22-J107-3.0 through structure and elevator control forward "T" bell crank.

(4) Loosen turnbuckle between rigged aft "T" bell crank and idler bell crank being removed.

(5) Disconnect control cables from idler bell crank.

(6) Remove bell crank pivot bolt and remove bell crank.

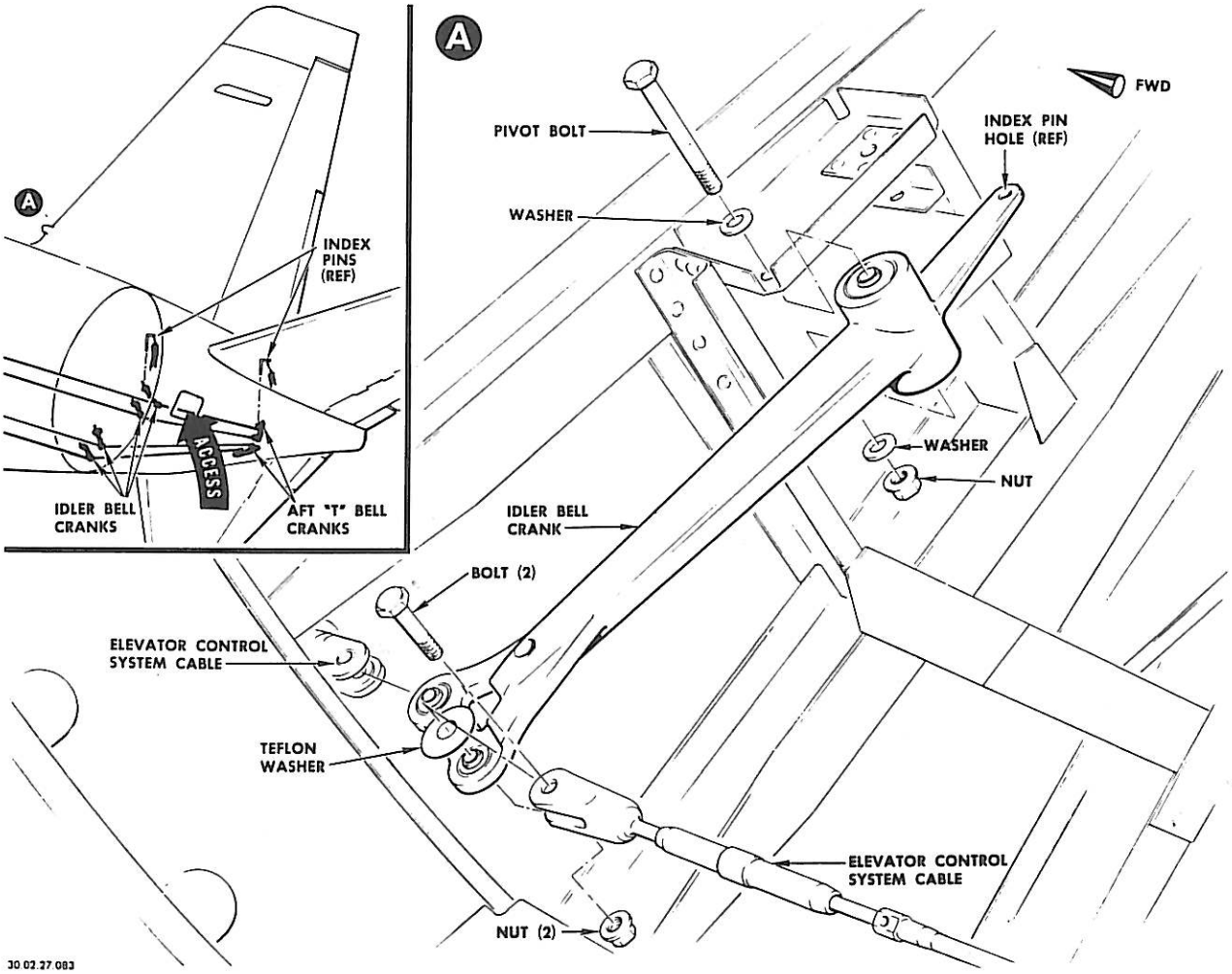
C. Install Elevator Control Idler Bell Crank.

NOTE: Prior to installing idler bell crank, check bearings in bell crank two-bearing assembly for evidence of binding on bolt, ratcheting, or excessive wear. Replace defective bearings (refer to 27-0, Bell Crank Bearing Installation - Typical).

(1) Position idler bell crank in airplane structure and install bell crank pivot bolt.

(2) Connect control cables to idler bell crank.

(3) Tighten turnbuckle loosened in step B.(4) to increase cable tension to 205 (±25) pounds at 70 degrees F (21 degrees C). Increase or decrease specified cable tension 1 pound for each degree F (2 pounds for each degree C) increase or decrease respectively in free air temperature.



Elevator Control Idler Bell Crank Installation
Figure 201

(4) Attempt to insert index pin 22-J107-2.0 in elevator aft "T" bell-crank. If index pin cannot be inserted, alternately loosen and tighten opposing cables aft of idler bell cranks until index pin can be inserted.

(5) Remove index pin from forward "T" bell crank and attempt to insert index pins 22-J107-2.5 in idler being installed and idler adjacent to the one being installed. If index pins cannot be installed, alternately loosen and tighten cables fore and aft of idlers until index pin holes in idlers and idler supports are aligned.

(6) Remove index pins, recheck cable tension, and safety turnbuckles with NAS 651 clips.

(7) Check elevator control system operation (refer to 27-5-0, Adjustment/ Test Elevator Control System Functional Test).

NOTE: If an idler bell crank only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, steps 2.E.(5), 2.E.(6) and 2.I. (10) through 2.I.(16).

ELEVATOR SERVO CONTROL QUADRANT - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Servo Control Quadrant (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching tail cone aft access door.

(2) Stand suitable for reaching tail cone forward access door.

(3) Index pin 22-J107-2.0 to rig elevator control aft bell crank.

(4) Index pin 22-J107-6.0 to rig elevator upper bell crank.

B. Remove Elevator Servo Control Quadrant.

(1) Check that flaps are in "full down" position. If not, lower flaps (refer to Removal/Installation Elevator, Paragraph 1.C, Step (1)).

NOTE: When flaps are fully extended, elevator downspring exerts negligible force on elevator control system.

(2) Open tail cone access doors.

(3) Insert index pin 22-J107-2.0 through elevator control left aft "T" bell crank.

(4) Loosen turnbuckles to relieve tension of servo control cables. Disconnect cables from servo quadrant.

(5) Disconnect upper control rod from forward arm of quadrant bell crank.

(6) Disconnect forward control rod from lower arm of quadrant bell crank.

(7) Remove quadrant pivot bolt and remove quadrant.

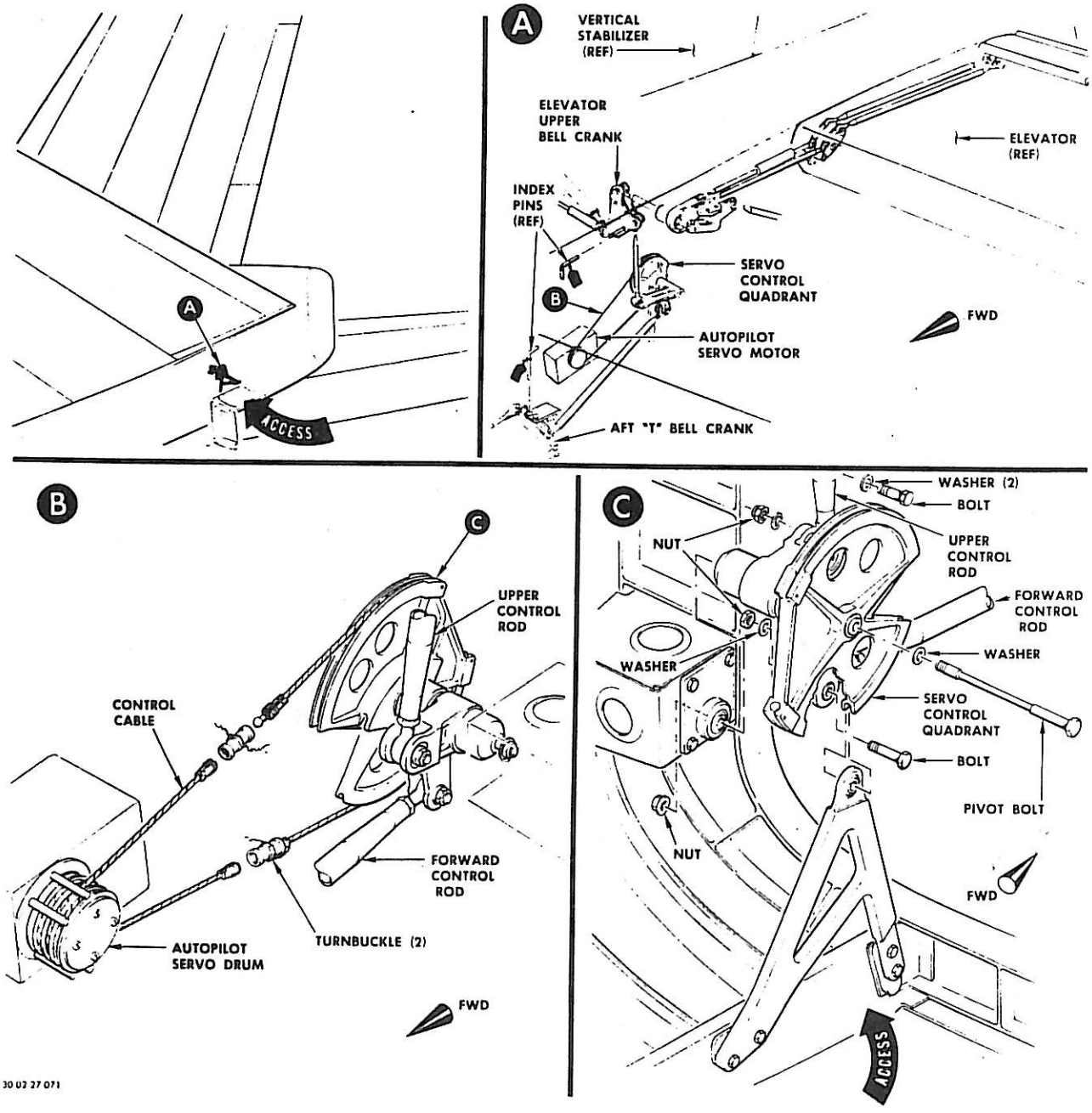
C. Install Elevator Servo Control Quadrant.

(1) Insert index pin 22-J107-6.0 through LH elevator upper bell crank and beam.

(2) Install servo control quadrant and quadrant pivot bolt.

(3) Connect fixed length upper control rod between rigged upper bell crank and forward arm of quadrant bell crank.

(4) Adjust forward control rod to fit between rigged LH elevator control aft "T" bell crank and lower arm of servo quadrant and install on lower arm of bell crank.



Elevator Servo Control Quadrant Installation
Figure 201

(5) Set elevator servo drum at neutral position and connect control cables to quadrant. Make sure cables are routed so that clockwise rotation of cable drum will cause clockwise rotation of servo quadrant.

(6) Tighten cable turnbuckles to obtain cable tension of 105 (±10) pounds at 70 degrees F (21 degrees C). Increase or decrease cable tension 0.5 pound for each degree F (1.0 pound for each degree C) increase or decrease respectively in free air temperature. Safety turnbuckles.

(7) Remove index pins.

(8) Test system (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

NOTE: If an elevator servo control quadrant only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, steps 2.E.(5), 2.E.(6) and 2.I.(10) through 2.I.(16).

(9) Check elevator autopilot operation (refer to Chapter 22, AUTOPILOT).

(10) Close access doors and return airplane to normal configuration.

ELEVATOR CONTROL UPPER BELL CRANK - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Upper Bell Crank (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching tail cone aft access door.

(2) Deleted.

(3) Index pins as follows:

Two index pins 22-J107-3.25 to rig elevator inboard bell crank and elevator aft "T" bell crank.

Two index pins 22-J107-6.0 to rig elevator upper bell cranks.

B. Remove Elevator Upper Bell Crank.

(1) Check that flaps are in "full down" position. If not, lower flaps (refer to Removal/Installation Elevator, Paragraph 1.C.Step (1)).

NOTE: When flaps are fully extended, elevator downspring exerts negligible force on elevator control system.

(2) Open tail cone aft access door.

(3) Open tail cone forward access door.

(4) Insert index pin 22-J107-3.25 through elevator control aft "T" bell crank connected directly to upper bell crank being removed.

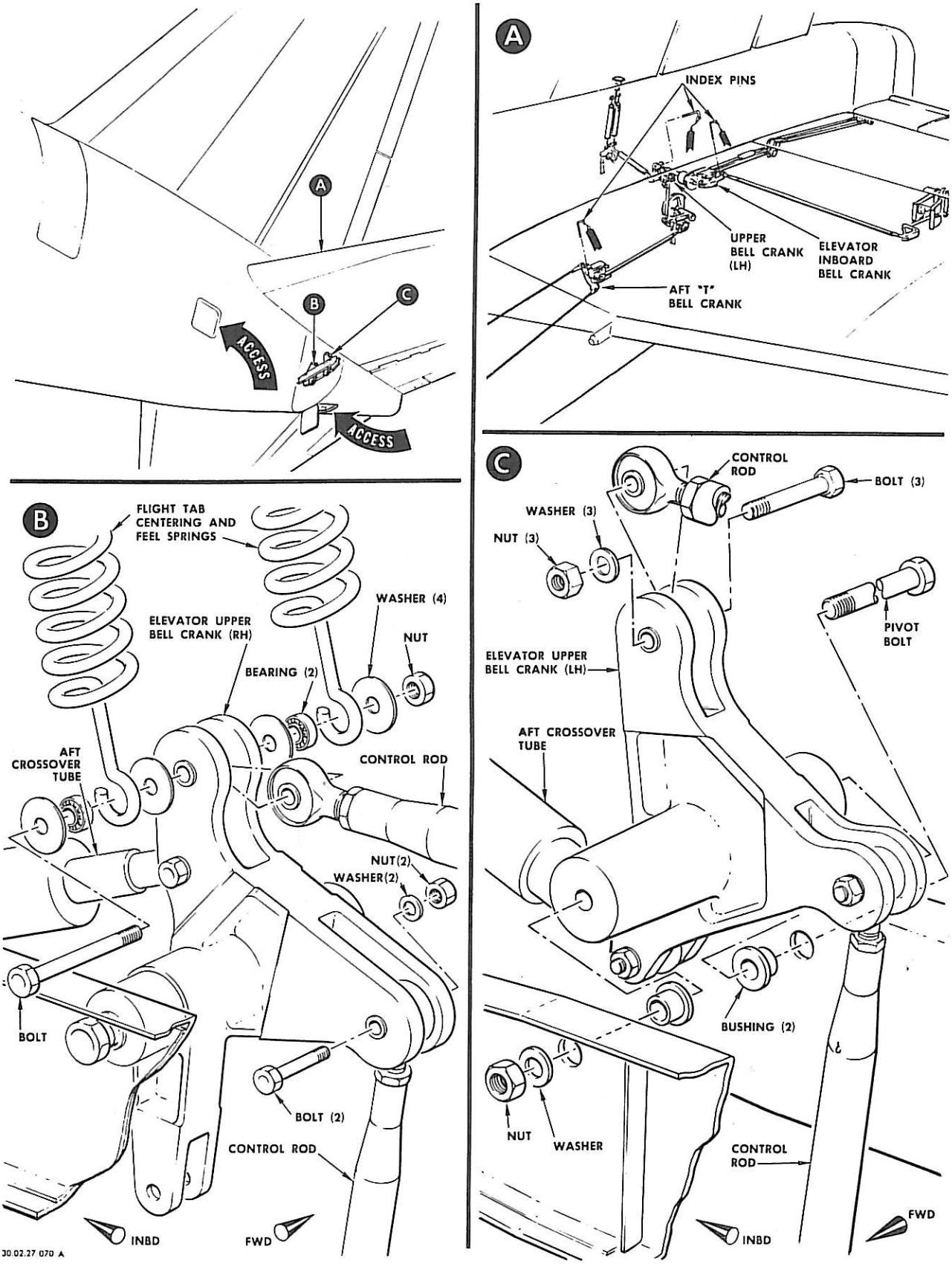
(5) Remove elevator inboard bell crank access panel from inboard end of stabilizer and insert index pin 22-J107-3.25 through inboard bell crank.

(6) Disconnect control rods and spring-loaded crossover tube from bell crank. If RH bell crank is being removed, disconnect flight tab centering and feel spring.

(7) Remove bell crank pivot bolt and remove bell crank.

C. Install Elevator Upper Bell Crank.

NOTE: Prior to installing bell crank, check bearings in bell crank two-bearing assembly for evidence of binding on bolt, ratcheting, or excessive wear. Replace defective bearings (refer to 27-0, Bell Crank Bearing Installation - Typical).


A
INDEX PINS
UPPER BELL CRANK (LH)
ELEVATOR INBOARD BELL CRANK
AFT "T" BELL CRANK
ACCESS
ACCESS
B
FLIGHT TAB CENTERING AND FEEL SPRINGS
WASHER (4)
NUT
ELEVATOR UPPER BELL CRANK (RH)
BEARING (2)
AFT CROSSOVER TUBE
CONTROL ROD
NUT(2)
WASHER(2)
BOLT
BOLT (2)
CONTROL ROD
INBD
FWD
C
CONTROL ROD
BOLT (3)
WASHER (3)
NUT (3)
PIVOT BOLT
ELEVATOR UPPER BELL CRANK (LH)
AFT CROSSOVER TUBE
BUSHING (2)
NUT
WASHER
CONTROL ROD
INBD
FWD
30.02.27 070 A

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 27-49.

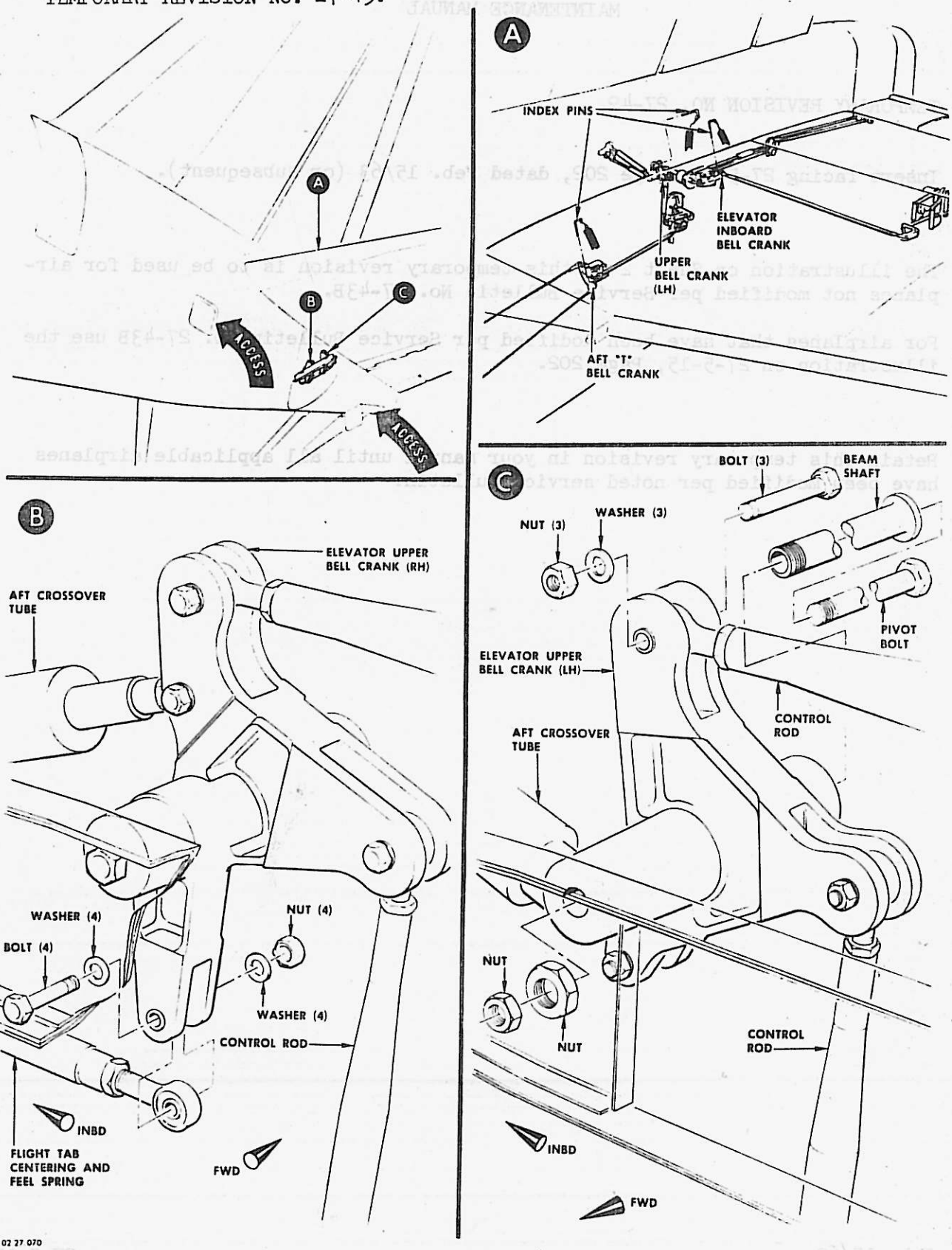
Insert facing 27-5-15, Page 202, dated Feb. 15/63 (or subsequent).

The illustration on Sheet 2 of this temporary revision is to be used for airplanes not modified per Service Bulletin No. 27-43B.

For airplanes that have been modified per Service Bulletin No. 27-43B use the illustration on 27-5-15, Page 202.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

TEMPORARY REVISION NO. 27-49.



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Feb. 15/63
AB

Elevator Control Upper
Bell Crank Installation
Figure 201

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 27-50.

Insert facing 27-5-15, Page 203, dated Feb. 15/63 (or subsequent).

The instructions in this temporary revision are to be used for airplanes not modified per Service Bulletin No. 27-43B.

For airplanes that have been modified per Service Bulletin 27-43B use the instructions beginning on 27-5-15, Page 203.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

Page 203, delete step (6) and substitute the following:

(6) If RH upper bell crank is being installed, adjust flight tab centering and feel spring to distance between rigged upper bell cranks, and connect to lower arm on RH upper bell crank.

(1) Install bell crank and bell crank pivot bolt.

(2) Insert index pin 22-J107-6.0 through RH and LH upper bell crank and beam.

(3) Adjust length of outboard control rod to fit between rigged elevator inboard and upper bell cranks.

(4) Connect inboard control rod between rigged upper bell crank outboard arm and lower bell crank.

(5) Adjust length of crossover tube to distance between rigged upper bell cranks. Connect tube to upper bell cranks.

(6) If RH upper bell crank is being installed, adjust centering and feel spring to distance between RH upper bell crank and bulkhead bracket. Connect lower end of spring to RH upper bell crank and tighten lock nuts on centering and feel spring clevis.

(7) Remove all index pins.

(8) Check elevator control system operation (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

NOTE: If an elevator upper bell crank only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, steps 2.E.(5), 2.E.(6), paragraph 2.G. and steps 2.I.(10) through 2.I.(16).

(9) Close access door, install access panels and return airplane to normal configuration.

ELEVATOR AFT CROSSOVER TUBE - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Spring-Loaded Crossover Tube (aft) (see Figure 201)

   A. Equipment Required.

      (1) Stand suitable for reaching tail cone aft access door.

      (2) Two index pins 22-J107-6.0 to rig elevator upper bell cranks.

   B. Remove Elevator Aft Crossover Tube.

      (1) Check that flaps are in "full down" position. If not, lower flaps (refer to Removal/Installation Elevator, Paragraph 1.C, Step (1)).

         NOTE: When flaps are fully extended, elevator downspring exerts negligible force on elevator control system.

      (2) Open tail cone aft access door.

      (3) Insert index pin 22-J107-6.0 through each elevator upper bell crank.

      (4) Disconnect ends of crossover tube from both upper bell cranks and remove tube.

   C. Install Elevator Aft Crossover Tube.

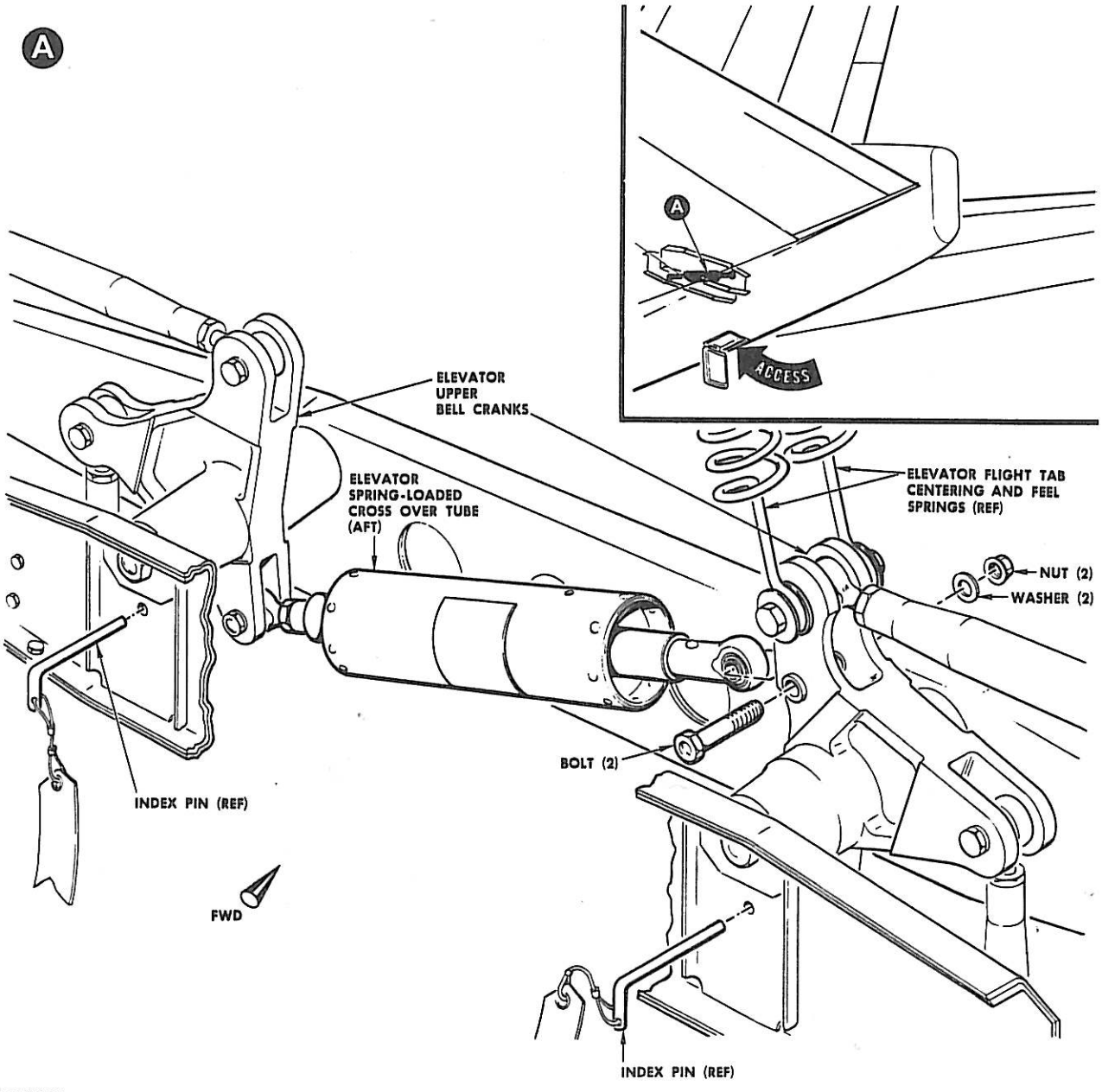
      (1) Adjust elevator crossover tube to distance between rigged RH and LH upper bell cranks.

      (2) Install crossover tube between upper arm of RH upper bell crank and lower arm of LH upper bell crank.

      (3) Remove index pins and test system (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

         NOTE: If the elevator aft crossover tube only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, steps 2.E.(5), 2.E.(6) and 2.I.(10) through 2.I.(16).

      (4) Close tail cone aft access door and return airplane to normal configuration.



Elevator Aft Crossover Tube Installation
Figure 201

CONVAIR MODEL 30

MAINTENANCE MANUAL

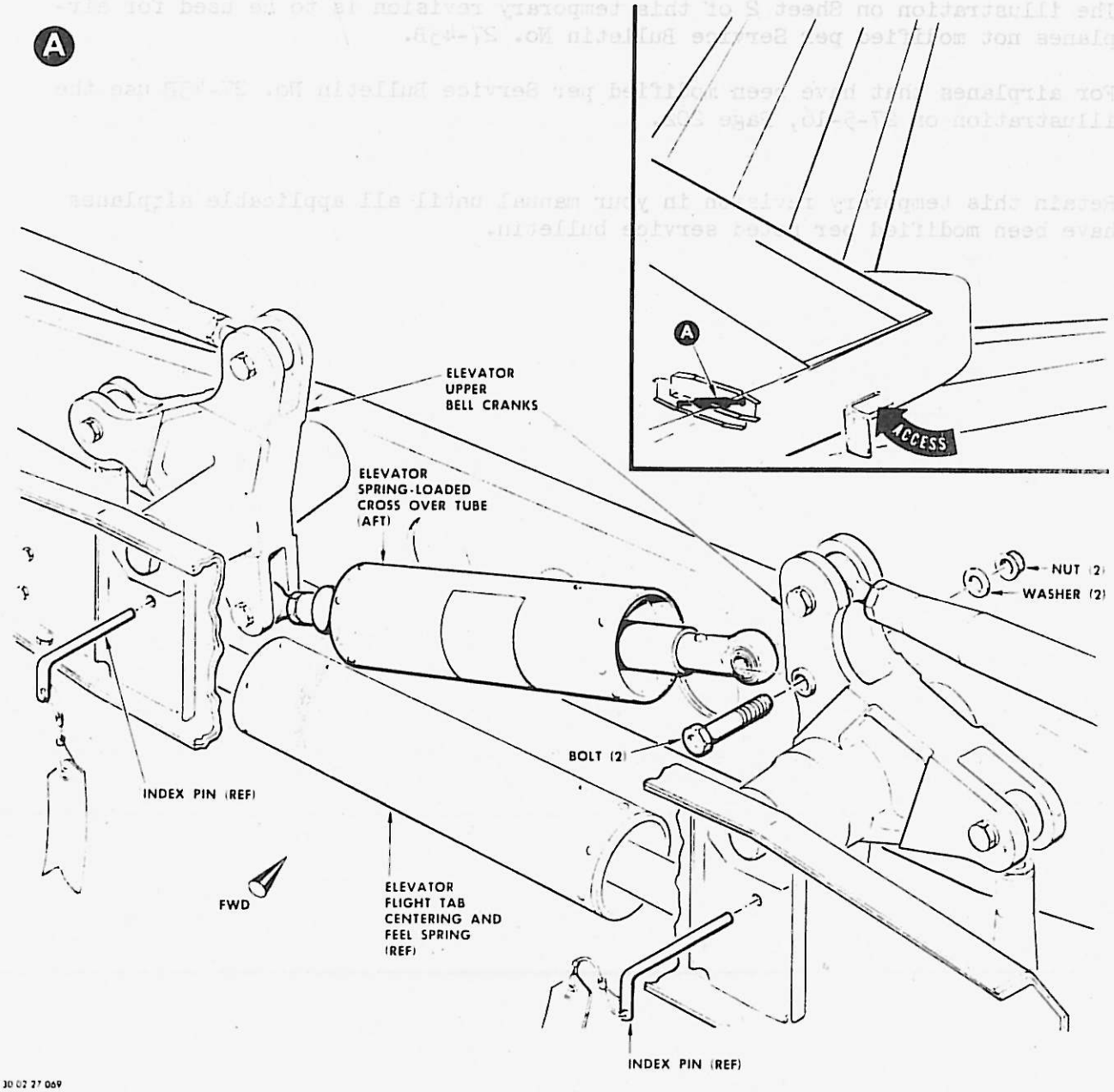
TEMPORARY REVISION NO. 27-51.

Insert facing 27-5-16, Page 202, dated Feb. 15/63 (or subsequent).

The illustration on Sheet 2 of this temporary revision is to be used for airplanes not modified per Service Bulletin No. 27-43B.

For airplanes that have been modified per Service Bulletin No. 27-43B use the illustration on 27-5-16, Page 202.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.



Elevator Aft Crossover Tube
Installation
Figure 201

ELEVATOR INBOARD BELL CRANK - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Inboard Bell Crank (see Figure 201)

   A. Equipment Required.

      (1) Stand suitable for reaching elevators.

      (2) Tool 30-00003-903, or -904, RGTL #1 to secure elevator in streamline position.

      (3) Protractor 30-00003-901 RGTL #2 to measure tab travel.

      (4) Index pins as follows:

      22-J107-3.25 to rig elevator inboard bell crank.

      22-J107-6.0 to rig elevator upper bell crank.

   B. Remove Elevator Flight Tab Inboard Bell Crank.

      (1) Check that flaps are in "full down" position. If not, lower flaps (refer to Removal/Installation Elevator, Paragraph 1.C. Step (1)).

      NOTE: When flaps are extended, elevator downspring exerts negligible force on elevator flight tab control cables.

      (2) Install tool 30-00003-903, or -904, RGTL #1 to secure elevator in streamline position (see 27-5-0, Figure 203).

      (3) Install protractor 30-00003-901 RGTL #2 and maintain elevator flight tab in streamline position (see 27-5-0, Figure 203).

      (4) Remove elevator inboard bell crank access panel.

      (5) Disconnect control rods from bell crank.

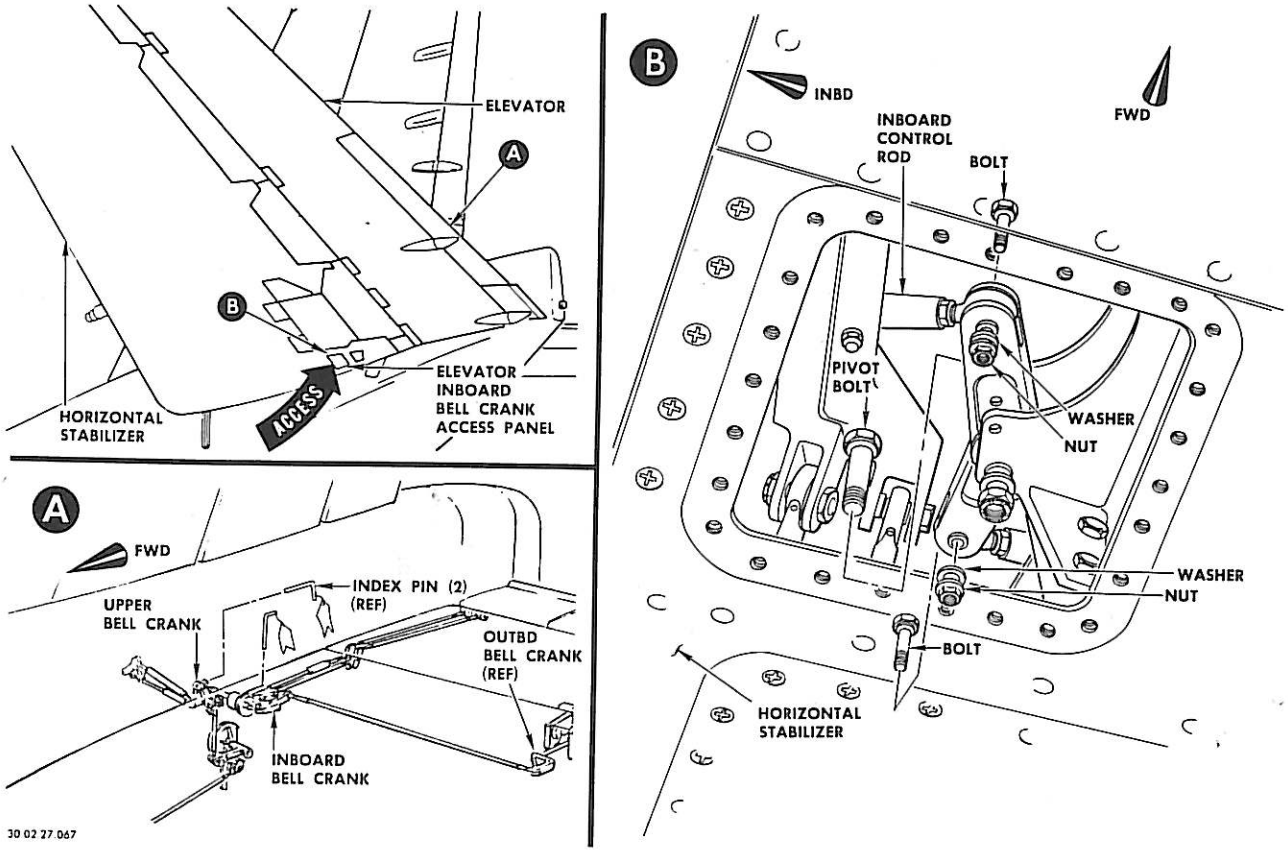
      (6) Remove bell crank pivot bolt and remove bell crank from stabilizer.

   C. Install Elevator Inboard Bell Crank.

      NOTE: Prior to installing bell crank, check bearings in bell crank two-bearing assembly for evidence of binding on bolt, ratcheting, or excessive wear. Replace defective bearings (refer to 27-0, Bell Crank Bearing Installation - Typical).

      (1) Install inboard bell crank and bell crank pivot bolt.

      (2) Insert index pin 22-J107-3.25 through bell crank and bell crank mounting bracket.



Elevator Inboard Bell Crank Installation
Figure 201

(3) Open tail cone aft access door and insert index pin 22-J107-6.0 through elevator upper bell crank and beam.

(4) Adjust length of control rod in stabilizer pivot to fit between rigged bell cranks, and connect control rod.

(5) With flight tab in streamline position, adjust transverse control rod to proper length to connect to rigged inboard bell crank. Connect control rod.

(6) Remove all tools and index pins.

(7) Check elevator control system operation (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

NOTE: If an elevator inboard bell crank only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, steps 2.E.(5), 2.E.(6) and 2.I.(10) through 2.I.(16).

(8) Close fuselage access door and install access panel in bottom of stabilizer.

(9) Return airplane to normal configuration.

ELEVATOR OUTBOARD BELL CRANK - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Outboard Bell Crank (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching elevators.

(2) Deleted.

(3) Tool 30-00003-903, or -904 RGTL #1 to secure elevator in streamline position.

(4) Protractor 30-00003-901 RGTL #2 to measure tab travel.

(5) Index pin 22-J107-3.25 to rig elevator inboard bell crank.

B. Remove Elevator Outboard Bell Crank.

(1) Check that flaps are in "full down" position. If not, lower flaps (refer to Removal/Installation Elevator, Paragraph 1.C, Step (1)).

NOTE: When flaps are extended, elevator downspring exerts negligible force on elevator flight tab control cables.

(2) Deleted.

(3) Remove elevator inboard and outboard bell crank access panels.

(4) Disconnect control rods from outboard bell crank.

(5) Remove bell crank pivot bolt and slide bell crank out of mounting bracket.

C. Install Outboard Bell Crank.

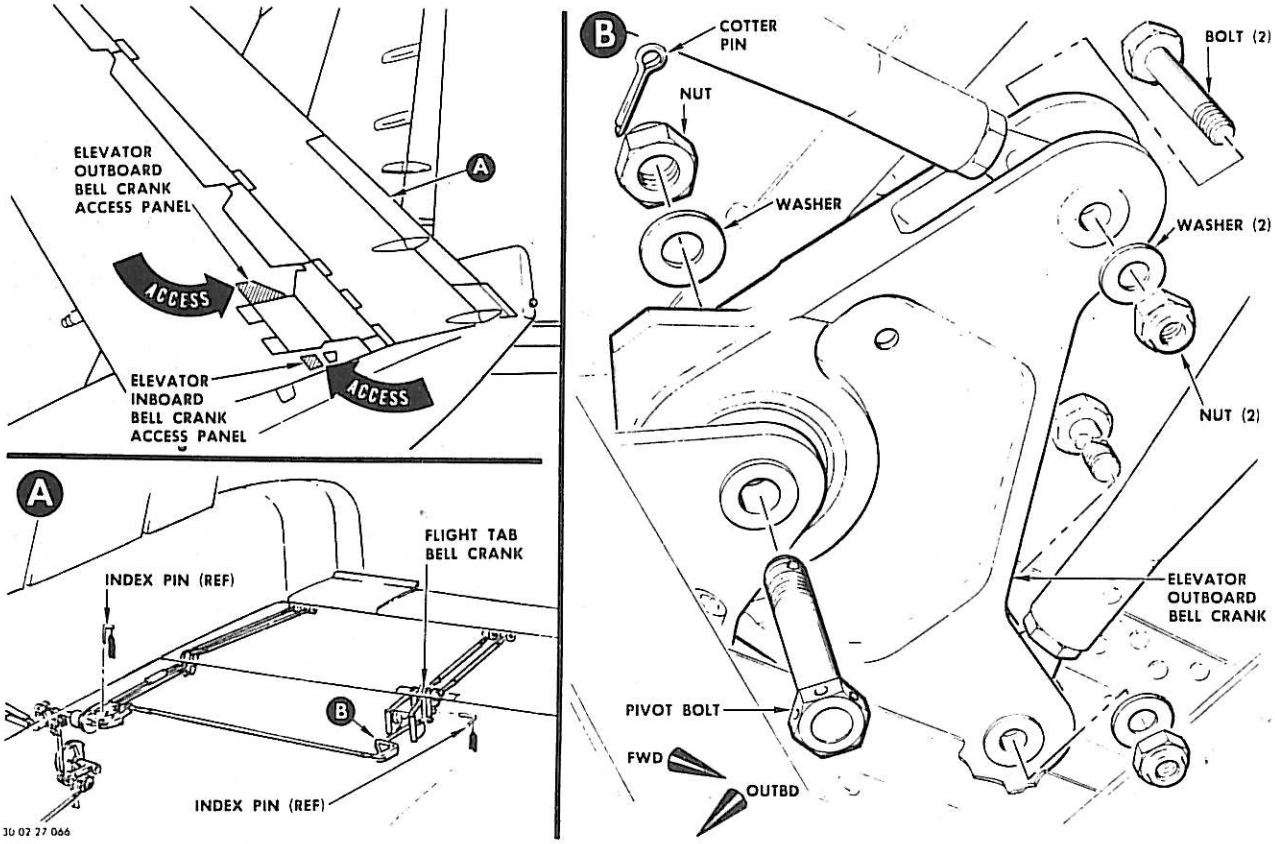
(1) Install tool 30-00003-903 or -904 RGTL #1 to secure elevator in streamline position (see 27-5-0, Figure 203).

(2) Install protractor 30-00003-901 RGTL #2 and maintain flight tab in streamline position (see 27-5-0, Figure 203).

(3) Insert index pin 22-J107-3.25 through elevator inboard bell crank and mounting bracket.

(4) Install outboard bell crank. Make sure that bell crank rotates freely after installation.

(5) Connect control rod extending aft to flight tab bell crank, to aft side of outboard bell crank.



Elevator Outboard Bell Crank Installation
Figure 201

(6) Adjust length of transverse control rod as required and connect to forward side of outboard bell crank.

(7) Remove index pin from inboard bell crank, remove protractor and tool used to secure elevator.

(8) Check elevator control system operation (refer to 27-5-0, Adjustment/ Test Elevator Control System Functional Test).

NOTE: If an elevator outboard bell crank only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, steps 2.E.(5), 2.E.(6) and 2.I.(10) through 2.I.(16).

(9) Install access panels and return airplane to normal configuration.

ELEVATOR FLIGHT TAB BELL CRANK - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Flight Tab Bell Crank (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching elevators.

(2) Tool 30-00003-903 or -904 to secure elevator in streamline position.

(3) Protractor 30-00003-901 RGTL #2 to measure tab level.

(4) Deleted.

(5) Index pins as follows:

22-J107-2.0 to secure flight tab bell crank in rig position (flight tab streamlined).

22-J107-3.25 to secure elevator inboard bell crank.

B. Remove Elevator Flight Tab Bell Crank.

(1) Check that flaps are in "full down" position. If not, lower flaps (refer to Removal/Installation Elevator, Paragraph 1.C. Step (1)).

NOTE: When flaps are fully extended, elevator downspring exerts negligible force on elevator control system.

(2) Remove elevator hinge access plates above and below flight tab bell crank.

(3) Remove elevator inboard bell crank access panel.

(4) Disconnect flight tab control rods from bell crank. Control rod connecting bolts may be removed through windows in bell crank mounting brackets when flight tab is raised.

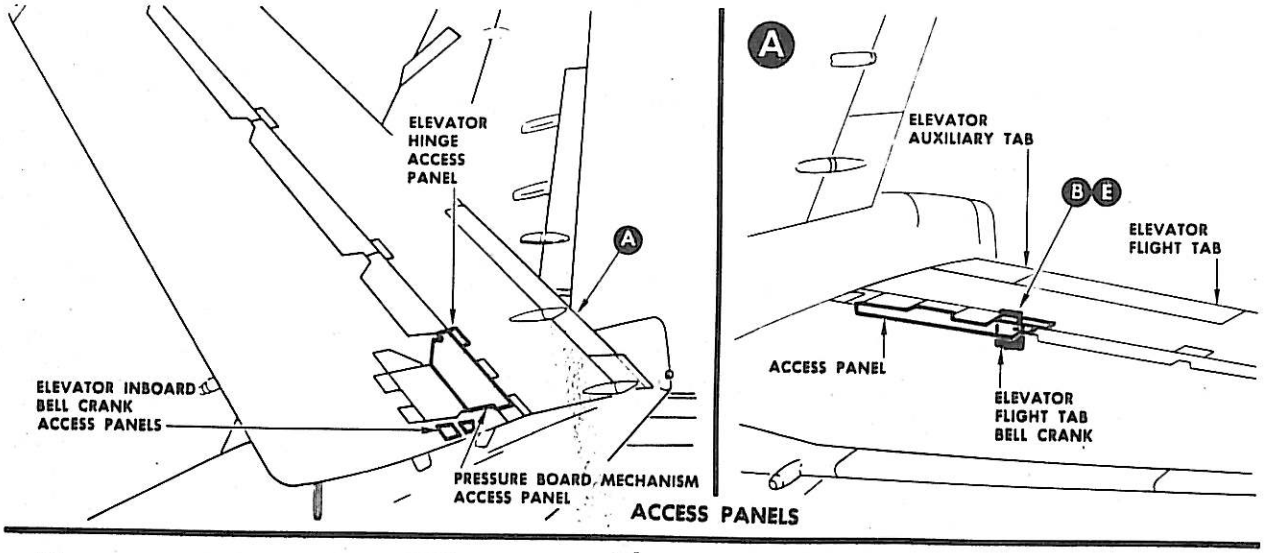
(5) Disconnect flutter damper connecting rods from bell crank.

(6) Disconnect control rod extending forward from bell crank.

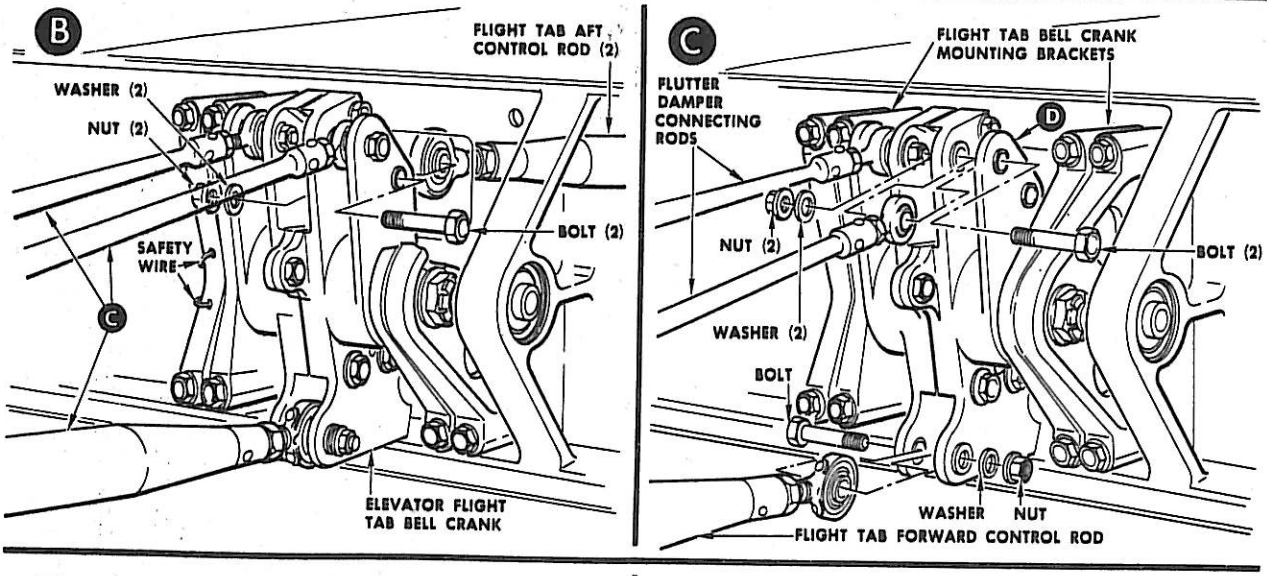
(7) Remove bolts securing bell crank mounting brackets to front of elevator. Remove bell crank and brackets.

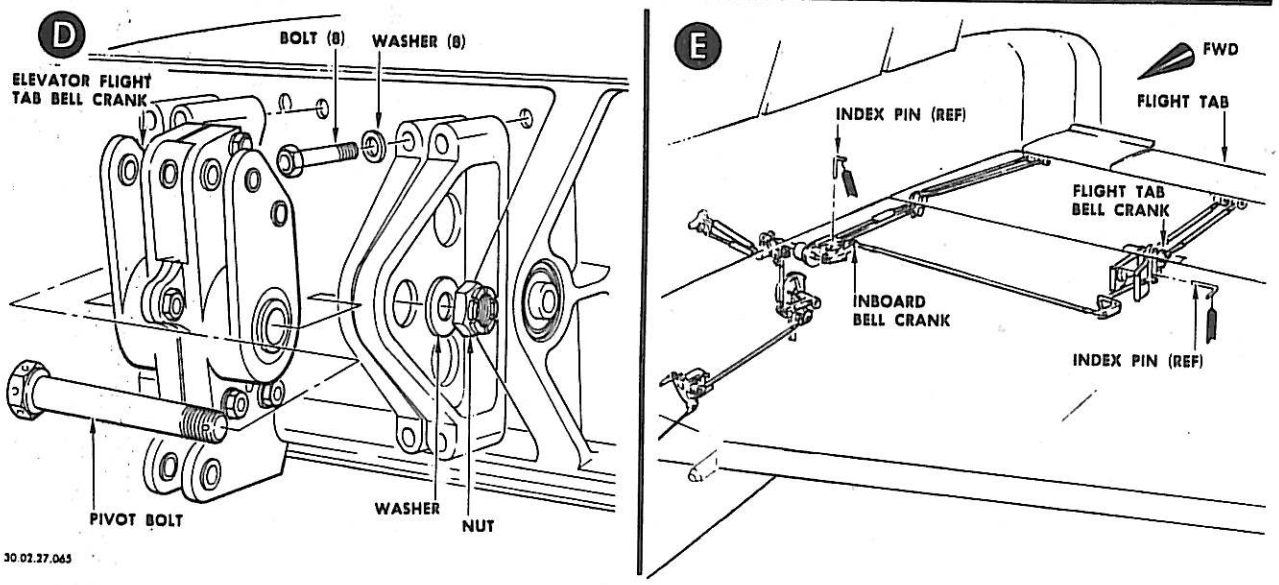
(8) Remove bell crank pivot bolt and bushing. Separate bell crank and brackets. Do not separate the two parts of each bracket. Note position and thickness of shims.

NOTE: The two parts of each bracket are joined by a bushing. Shims are used between the bracket parts and under the bushing flange.



ACCESS PANELS





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C. Install Elevator Flight Tab Bell Crank.

NOTE: Prior to installing flight tab bell crank, check bearings in bell crank two-bearing assembly for evidence of binding on bolt, ratcheting, or excessive wear. Replace defective bearings (refer to 27-0, Bell Crank Bearing Installation - Typical).

(1) Assemble bell crank and brackets. Do not tighten pivot bolt.

(2) Install bell crank assembly on front of elevator. Tighten all eight mounting bolts and measure bell crank side play.

(3) If side play exists, remove bell crank and take up side play with shims under flanges of mounting bracket bushings. Divide shims so that bushings are shimmed equally. Torque pivot bolt to between 225 and 275 inch-pounds. Safety head of pivot bolt to bell crank mounting bracket.

(4) Reinstall bell crank and brackets on front spar of elevator.

(5) Remove lower half of semi-circular access plate just inboard of bell crank mounting bracket.

(6) Install tool 30-00003-903, or -904, RGTL #1 (LH or RH) to secure elevator in streamline position (see 27-5-0, Figure 203).

(7) Install protractor 30-00003-901 RGTL #2 and maintain flight tab in streamline position.

(8) Insert index pin 22-J107-2.0 through flight tab bell crank and mounting bracket.

(9) Adjust flight tab control rods to fit between rigged flight tab and flight tab bell crank, and connect control rods to bell crank.

(10) Insert index pin 22-J107-3.25 through elevator inboard bell crank.

(11) Connect control rod to bottom of flight tab bell crank. If connection cannot be made with index pins installed in both bell cranks, adjust rod as necessary.

(12) With control rods properly connected to bell cranks and flight tab, remove index pins from flight tab bell crank and elevator inboard bell crank.

(13) Remove protractor and tool used to secure elevator in neutral position.

(14) Check elevator control system operation (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

NOTE: If an elevator flight tab bell crank only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, steps 2.E.(5), 2.E.(6), and 2.I.(10) through 2.I.(16).

(15) Install access panels and plates and return airplane to normal configuration.

ELEVATOR AUXILIARY TAB - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Auxiliary Tab (see Figure 201)

A. General.

Removal and installation procedures for the elevator auxiliary tabs are identical except for being left and right assemblies. The elevator auxiliary tabs are not balanced, and any auxiliary tab may be used without balancing the elevator provided the tab's weight does not exceed 6.50 pounds. (Do not include attaching parts (nuts, bolts, and washers) when weighing tabs.) If the tab's weight exceeds 6.50 pounds, the elevator must be rebalanced. (Refer to the 990 Structural Repair Manual for balancing instructions.)

B. Equipment Required.

(1) Graphite grease, Specification MIL-G-8187.

(2) Stand suitable for reaching elevators.

(3) Torque wrench calibrated in inch-pounds.

(4) Tool-30-00003-901 or -902 RGTL #1 (LH or RH) for measuring elevator and stabilizer travel.

(5) Tool 30-00003-903 or -904 RGTL #1 (LH or RH) for securing elevator in streamline position with stabilizer.

(6) Index pin 22-J107-2.25.

(7) Protractor 30-00003-901 RGTL #2 for measuring tab travel.

C. Remove Elevator Auxiliary Tab.

(1) Remove auxiliary tab horn cover and control rod fairing.

(2) Remove hinge access plates from auxiliary tab.

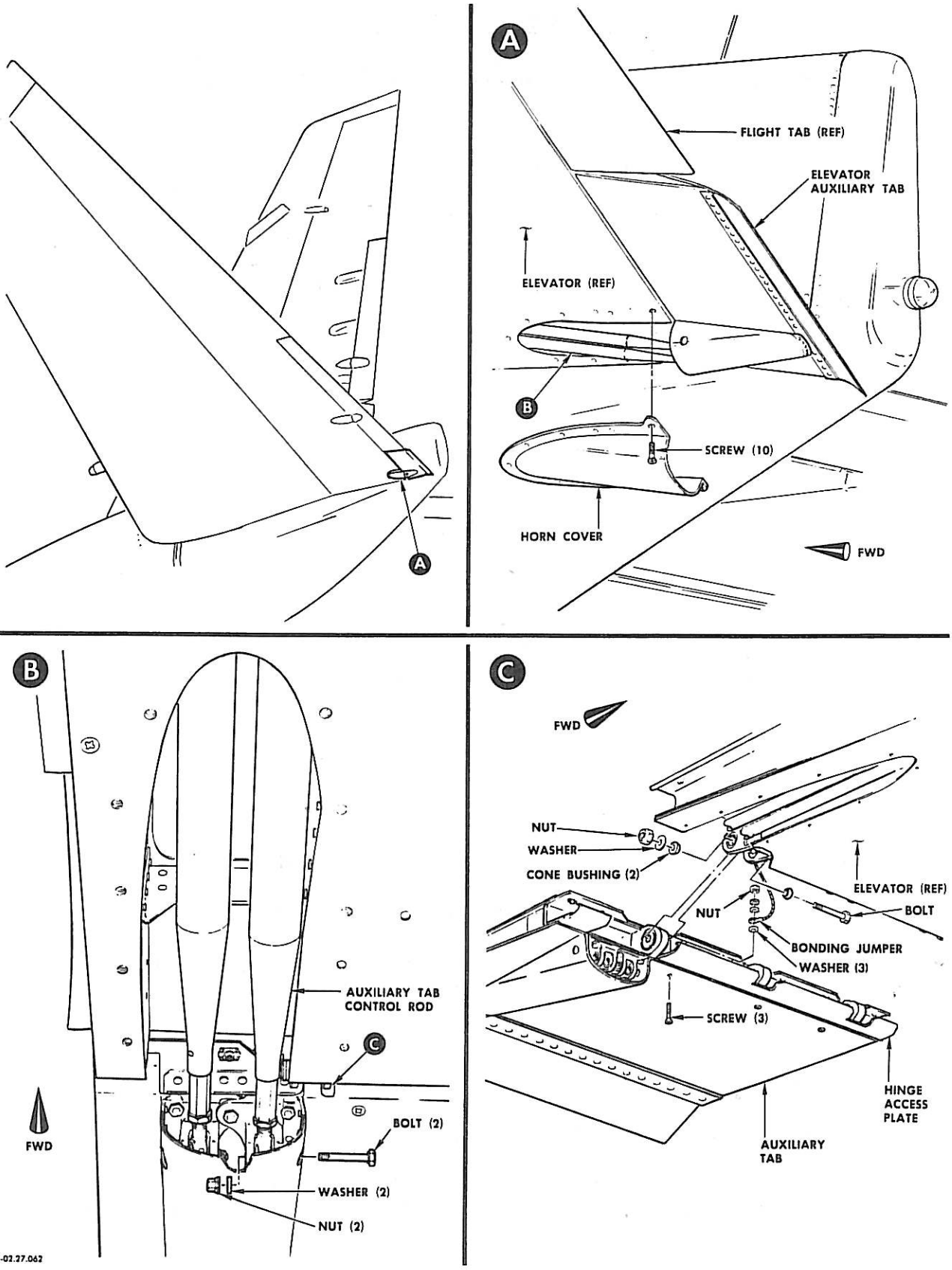
(3) Remove auxiliary tab bell crank access panel and auxiliary tab control rods access panel from bottom of stabilizer.

(4) Deleted.

(5) Disconnect control rods from auxiliary tab horn.

(6) Disconnect bonding jumpers from tab.

(7) Remove auxiliary tab hinge bolts, slide tab aft to clear hinge fittings, and remove tab. Note positions of cone bushings used at each hinge point.



Elevator Auxiliary Tab Installation
Figure 201

D. Install Auxiliary Tab.

(1) Align auxiliary tab and elevator hinge fittings. Install cone bushings and hinge bolts (refer to 27-0, Installation Split Cone Bushings).

NOTE: Torque hinge bolt nuts to between 50 and 70 inch-pounds.

(2) Move tab up and down to full travel limits after torquing each bolt. There must be no discernible binding or side load on any fitting.

(3) Connect bonding jumpers (three places). Make sure that jumpers are routed so they will not interfere with hinge fittings.

(4) Set stabilizer at 0-degree trim. Small hole in leading edge of stabilizer should be in line with brazier head rivets in side of fuselage.

(5) Install tool 30-00003-903, or -904, RGTL #1 (LH or RH) to secure elevator in streamline position with respect to stabilizer (see 27-5-0, Figure 203).

(6) Install protractor 30-00003-901, or -902, RGTL #1 (LH or RH) on trailing edge of stabilizer. With stabilizer set at 0-degrees, adjust protractor pointer to 0-degrees.

(7) Install tool 30-00003-901 RGTL #2 and maintain auxiliary trim tab at 12.0 (±0.5) degrees trailing edge down.

(8) Using stabilizer emergency trim handcrank, set stabilizer at 4.5 degrees trailing edge up.

(9) Insert index pin 22-J107-2.25 through auxiliary tab bell crank at elevator hinge line.

NOTE: Inserting the index pin in the auxiliary tab bell crank checks tab rigging forward of the elevator and stabilizer position. If rigging is correct, index pin cannot be inserted with stabilizer at any position other than 4.5 degrees trailing edge up.

(10) Adjust auxiliary tab control rods to length between rigged bell crank and tab.

(11) Remove tool securing elevator in streamline position. Remove index pin from bell crank.

(12) Check auxiliary tab travel (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

NOTE: If an auxiliary tab only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, paragraph 2.H.

(13) Remove protractor used for measuring tab travel.

(14) Install access panels and fairings.

ELEVATOR AUXILIARY TAB BELL CRANK - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Auxiliary Tab Bell Crank (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching elevators.

(2) Protractor 30-00003-901 or -902, RGTL #1 (LH or RH) for measuring elevator and stabilizer travel.

(3) Tool 22-00003-903 or -904, RGTL #1 (LH or RH) for securing elevator in streamline position.

(4) Protractor 30-00003-901 RGTL #2 for measuring auxiliary tab travel.

(5) Index pin 22-J107-2.25.

(6) Torque wrench calibrated in inch-pounds.

B. Remove Auxiliary Tab Bell Crank.

(1) Deleted.

(2) Remove auxiliary tab bell crank access panel from inboard aft corner of stabilizer lower surface and elevator hinge access plates from inboard forward corner of elevator.

(3) Disconnect auxiliary tab control rods from upper end of bell crank.

(4) Disconnect spring-cartridge control rod and shear-fail control rod from center of bell crank.

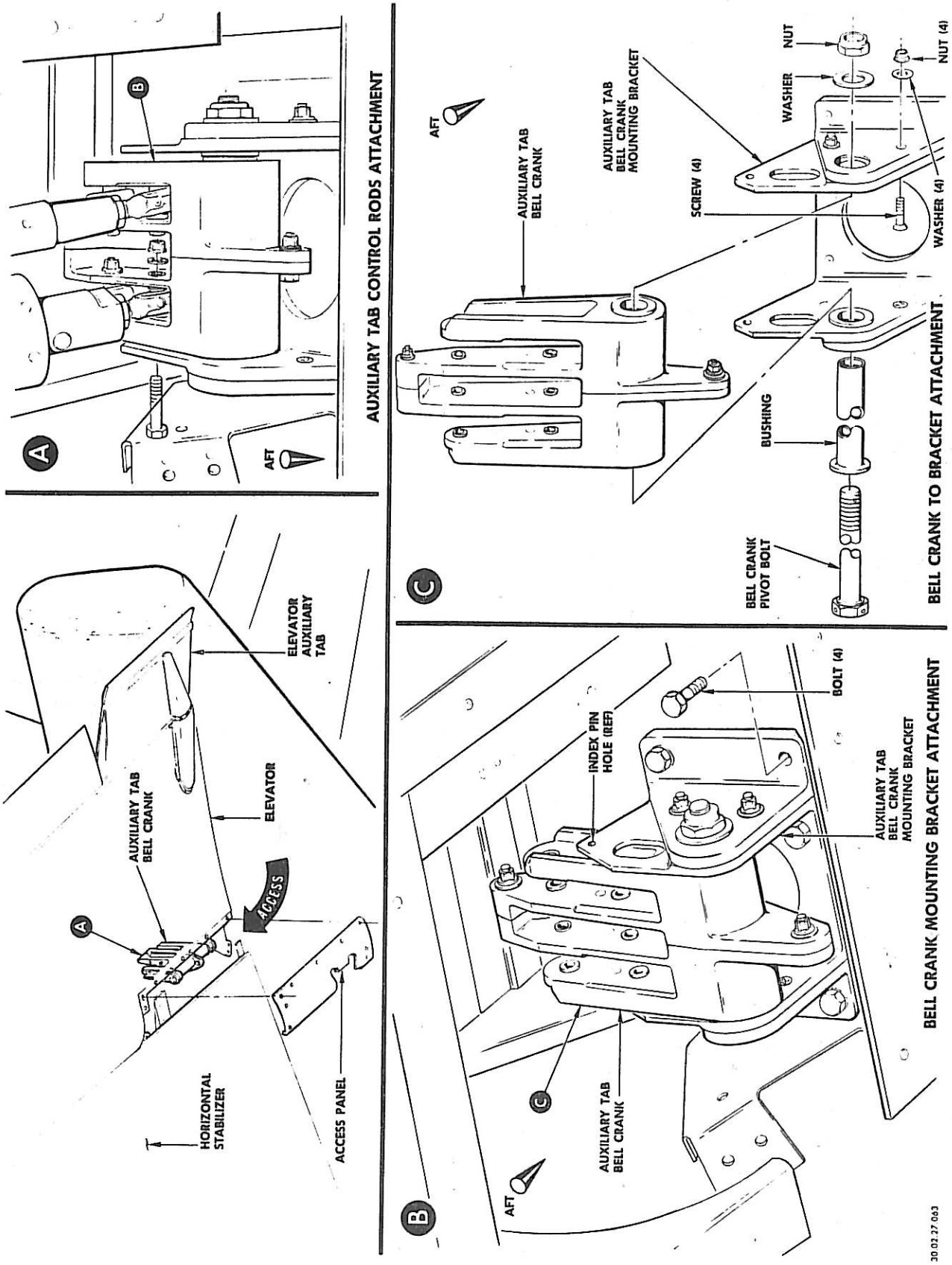
(5) Remove mounting bolts from base of bell crank mounting bracket and remove bell crank and bracket as an assembly.

(6) Remove bell crank pivot bolt and bushing from bell crank and bracket assembly. Note position and thickness of shims.

C. Install Auxiliary Tab Bell Crank.

(1) Make sure that bushings are properly installed in bell crank and both sides of mounting bracket. Align bell crank in bracket and insert pivot bushing. Check side play of bell crank in bracket. Install shims as required to reduce side play to less than 0.010 inch.

(2) With bell crank properly shimmed, install pivot bolt and nut. Torque nut to between 225 and 275 inch-pounds.



Elevator Auxiliary Tab Bell Crank Installation
Figure 201

(3) Position bell crank and bracket assembly on elevator main spar, and install mounting bolts.

(4) Using stabilizer emergency trim handcrank, set stabilizer at 0-degree trim. Small hole in stabilizer leading edge should be aligned with rivets in side of fuselage.

(5) Install protractor 30-00003-901, or -902, RGTL #1 (LH or RH) on trailing edge stabilizer (see 27-5-0, Figure 203). Adjust protractor to zero.

(6) Adjust stabilizer to 4.5 degrees trailing edge up.

(7) Install tool 30-00003-903, or -904, RGTL #1 to secure elevator in streamline position, relative to stabilizer (see 27-5-0, Figure 203).

(8) Install tool 30-00003-901 RGTL #2 and maintain auxiliary tab at 12 (±0.25) degrees trailing edge down relative to stabilizer (see 27-5-0, Figure 203).

(9) Insert index pin 22-J107-2.25 through auxiliary tab bell crank and bell crank mounting bracket.

(10) Adjust shear-fail control rod to length between rigged bell crank and static lever, and install rod.

(11) Adjust spring-cartridge control rod to length between rigged bell crank and static lever, and install rod. Spring-cartridge control rod should measure 20.59 inches, measured between rod end bearing center.

(12) Adjust auxiliary tab control rods to length between rigged bell crank and auxiliary tab and install control rods.

(13) Remove tool securing elevator in streamline position. Remove index pin from auxiliary tab bell crank.

(14) Check auxiliary tab travel (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

NOTE: If an auxiliary tab bell crank only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, paragraph 2.H.

(15) Remove all tools and install access panel and hinge access plate.

ELEVATOR AUXILIARY TAB STATIC LEVER - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Auxiliary Tab Static Lever (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching elevators.

(2) Tool 30-00003-901, or -902, RGTL #1 (LH or RH) to measure stabilizer travel.

(3) Tool 30-00003-903, or -904, RGTL #1 (LH or RH) to secure elevator in streamline position.

(4) Index pin 22-J107-3.25 to secure elevator inboard bell crank in rig position.

(5) Index pin 22-J107-2.25 to secure auxiliary tab bell crank in rig position.

(6) Index pin 22-J107-6.0 to secure elevator upper bell crank in rig position.

(7) Deleted.

B. Remove Elevator Auxiliary Tab Static Lever.

(1) Deleted.

(2) Using stabilizer emergency trim handcrank, set stabilizer at 0-degrees. Small hole in leading edge of stabilizer must be aligned with reference rivets in fuselage.

(3) Install tool 30-00003-901, or -902, RGTL #1 on trailing edge of stabilizer and set pointer at 0 degrees.

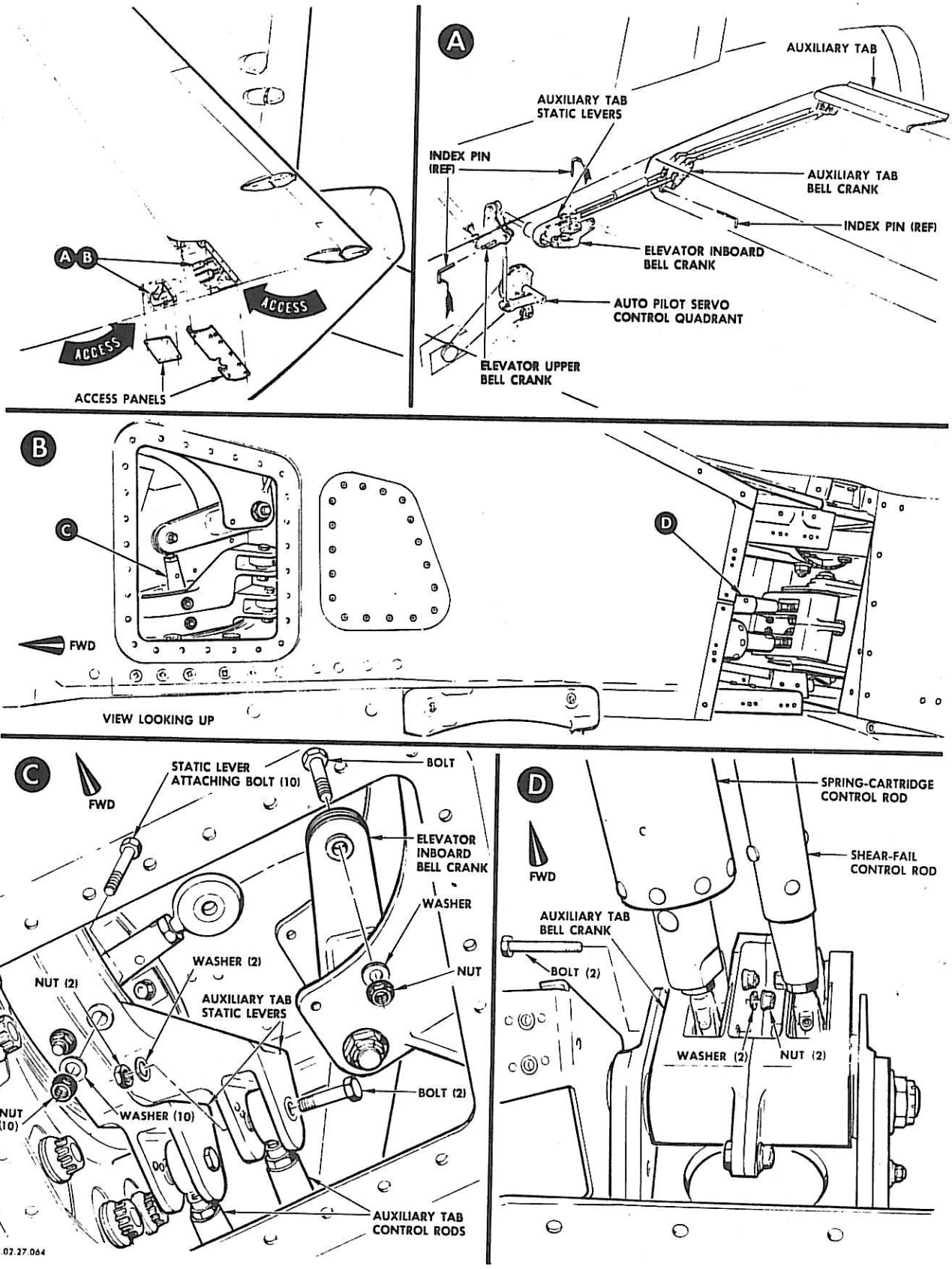
(4) Using handcrank, set stabilizer at 4.5 degrees trailing edge up.

(5) Remove auxiliary tab bell crank access panel from lower aft inboard corner of stabilizer. Remove elevator inboard hinge access plates.

(6) Remove stabilizer pivot access panel from lower inboard edge of stabilizer, forward of elevator inboard bell crank access.

(7) Install tool 30-00003-903, or -904, RGTL #1 to secure elevator in streamline position (see 27-5-0, Figure 203).

(8) Insert index pin 22-J107-2.25 through auxiliary tab bell crank and mounting bracket on inboard leading edge of elevator.



Elevator Auxiliary Tab Static Lever Installation
Figure 201

(9) Insert index pins 22-J107-3.25 and -6.0 through elevator inboard and upper bell cranks respectively.

(10) Disconnect auxiliary tab shear-fail control rod from static lever.

(11) Disconnect spring-cartridge control rod from auxiliary tab bell crank, and control rod from forward arm of elevator inboard bell crank.

(12) Remove bolts attaching static levers to stabilizer pivot shaft and remove static levers with spring-cartridge control rod attached.

(13) Disconnect spring-cartridge control rod from static lever.

C. Install Elevator Auxiliary Tab Static Lever.

(1) Adjust spring-cartridge control rod to a free length of 20.59 inches, measured between centers of rod end bearings. Lock adjustment.

(2) Connect spring-cartridge control rod to static lever.

(3) Install static lever on stabilizer pivot shaft and connect aft end of spring-cartridge control rod to auxiliary tab bell crank. Static lever and control rod should fit between pivot shaft and auxiliary tab bell crank without tension on spring-cartridge control rod.

(4) Install shear-fail control rod between static lever and auxiliary tab bell crank. Adjust rod as required. Rod must fit between lever and bell crank without imposing a load on spring-cartridge control rod.

(5) Install bolts attaching static levers to stabilizer pivot shaft. Bolt holes should require no realignment if stabilizer is positioned as outlined in paragraph 1.B.

(6) Connect control rod to forward arm of elevator inboard bell crank.

(7) Remove tools installed in steps B.(1) and B.(7). Remove index pins from auxiliary tab bell crank and elevator inboard and upper bell cranks.

(8) Check auxiliary tab travel (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

NOTE: If an auxiliary tab static lever only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, paragraph 2.H.

(9) Remove protractor and install access panels.

ELEVATOR AUXILIARY TAB SPRING-CARTRIDGE CONTROL ROD - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Auxiliary Tab Overload Spring

   A. General.

      The elevator auxiliary tab overload spring is removed and installed with the elevator auxiliary tab static lever. For removal and installation of the spring-cartridge control rod refer to Removal/Installation Elevator Auxiliary Tab Static Lever.

ELEVATOR DOWNSPRING - MAINTENANCE PRACTICES

1. Removal/Installation Elevator Downspring (see Figure 201)

A. Equipment Required.

(1) Stand or ladder suitable for use in entering hydraulics compartment.

(2) Wash prime thinner (MIL-C-8514).

(3) Molybdenum disulphide powder (MIL-L-7866).

(4) Solvent - Methyl ethyl ketone or equivalent.

B. Remove Elevator Downspring.

(1) Check that flaps are in "full down" position. If not, lower flaps (refer to Removal/Installation Elevator, Paragraph 1.C., Step (1)).

(2) Open hydraulic compartment door.

(3) Remove two overhead panels from left side of compartment.

(4) Disconnect flexible drive shaft from end of downspring drive screw.

(5) Remove bolt through downspring lever and control cable link and disconnect lever from cable.

(6) Remove two bolts attaching downspring drive screw bearing housing to structure. Screw drive screw out of drive nut and remove drive screw.

(7) Remove passenger seats and carpet to gain access to floor panel above elevator downspring installation (refer to Chapter 25, EQUIPMENT/FURNISHINGS).

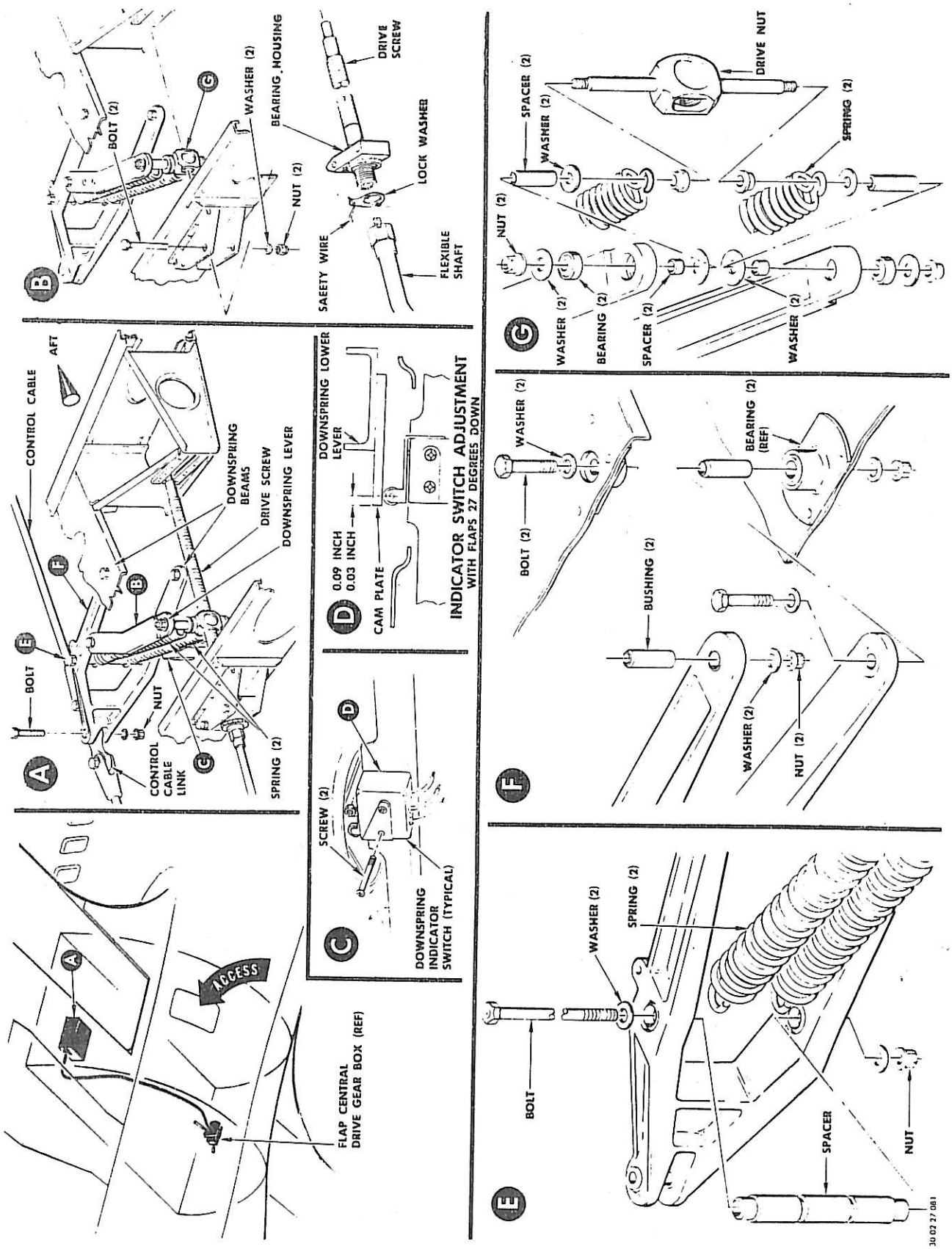
(8) Remove floor panel above elevator downspring installation.

(9) Remove downspring indicator switches (refer to Removal/Installation Downspring Indicator Switches).

*(10) Disconnect autopilot monitor circuit switch (refer to Chapter 22, AUTOPILOT).

(11) Remove four bolts attaching spring lever and beams to structure. Remove downspring assembly.

*Applicable to Group II airplanes CV1 through CV25 and CV35 through CV37; also applicable to airplanes CV26 through CV34 after incorporation of Service Bulletin No. 27-48. For group designations refer to Manual INTRODUCTION.



Elevator Downspring Installation
Figure 201

(12) Check ball bearings in airplane structure at mounting points of outboard ends of downspring lever. Remove and replace bearings as required.

C. Install Elevator Downspring.

(1) Clean and lubricate downspring drive screw as follows:

(a) Clean threaded portion only of drive screw and drive nut with solvent (methyl ethyl ketone).

(b) Dip in wash prime thinner (MIL-C-8514) for five to ten minutes.

(c) Dust drive screw and drive nut threads completely with molybdenum disulphide powder (MIL-L-7866).

(d) Allow drive screw to dry, then rotate full length of drive screw through drive nut several times. Drive screw must operate freely.

(2) Position downspring assembly in airplane structure and install four retaining bolts; two bolts in outboard end of spring lever and one bolt through inboard end of each spring beam.

(3) Insert downspring drive screw through hole in structure and thread into downspring drive nut. Thread drive screw into nut until center of drive nut is 2.13 inches from aft (free) end of drive screw.

(4) Install two bolts to retain drive screw bearing housing.

(5) Operate drive screw manually through one complete cycle to insure no binding in drive nut or drive screw bearing housing. Return drive screw to measurement in step (3).

(6) Connect downspring lever to link in elevator control cable.

(7) Connect flexible drive shaft to end of drive screw with detents on lock washer in notches on drive shaft retaining nut. Torque retaining nut to between 10 and 20 inch-pounds and safety lock washer.

(8) Retract flaps to "full up" position (refer to Removal/Installation Elevator, Paragraph 1.C., step (1) and move flap control lever to 0° detent position).

(9) Check that center of drive nut is 11.60 ($\pm$0.5) inches from aft end of drive screw.

(10) Install downspring indicator switches (refer to Removal/Installation Elevator Downspring Indicator Switches).

*(11) Disconnect autopilot monitor circuit switch (refer to Chapter 22, AUTOPILOT).

(12) Lubricate elevator downspring (refer to Chapter 12, SERVICING).

(13) Test system (refer to 27-5-0, Adjustment/Test Elevator Control System Functional Test).

NOTE: If the elevator downspring only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, paragraphs 2.I. and 2.J.

(14) Install floor panel above downspring installation.

(15) Install carpet and passenger seats (refer to Chapter 25, EQUIPMENT/FURNISHINGS).

(16) Install overhead panels in hydraulic compartment, close compartment access door and return airplane to normal configuration.

2. Removal/Installation Elevator Downspring Drive (see Figure 202)

A. Equipment Required - Stand suitable for entering hydraulic compartment.

B. Remove Elevator Downspring Drive.

(1) Check that flaps are in "full up" position. If not, raise flaps (refer to Removal/Installation Elevator, Paragraph 1.C., step (1)).

(2) Open hydraulic compartment access door.

(3) Remove two overhead panels from left side of hydraulic compartment.

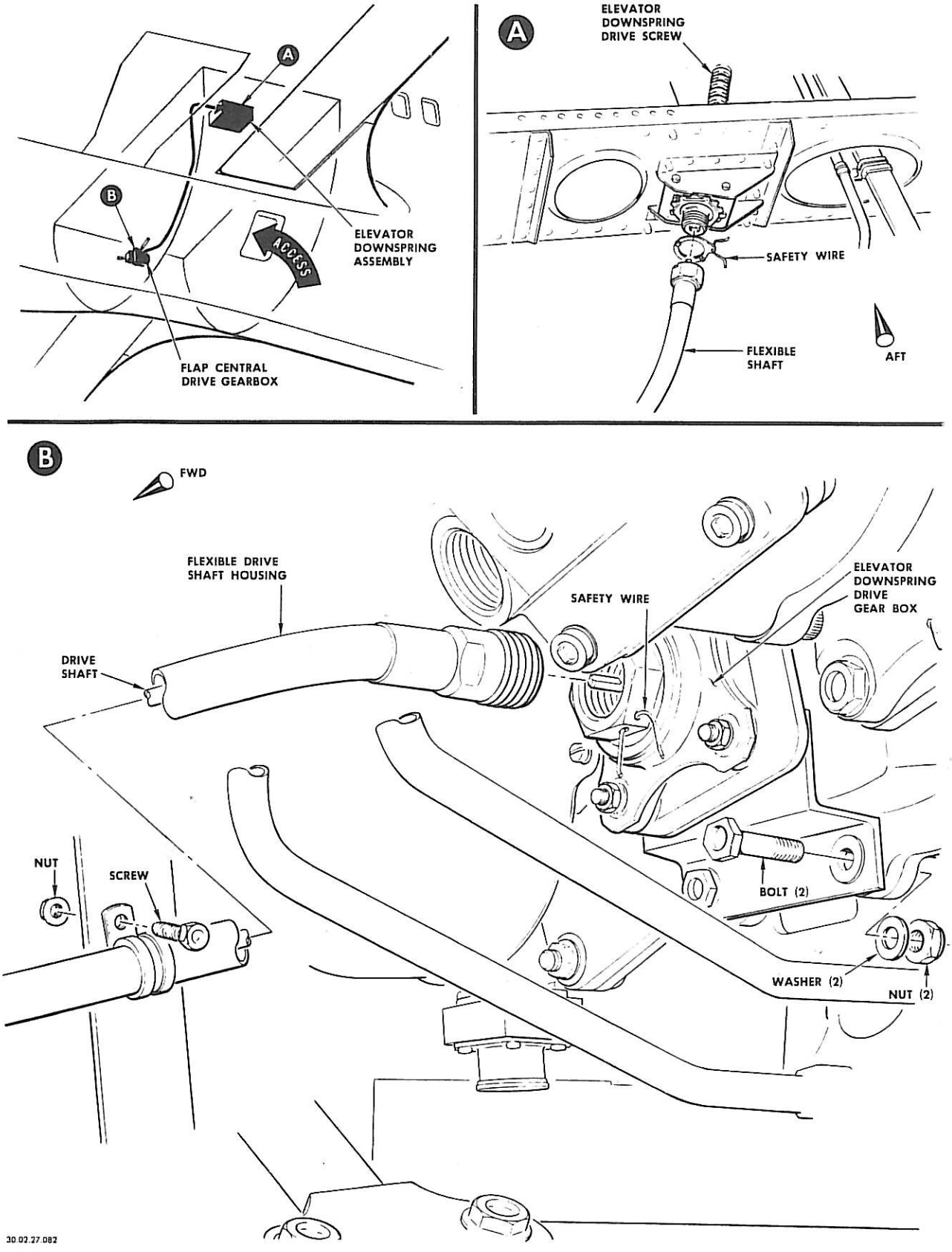
(4) Disconnect flexible drive shaft from end of downspring drive screw.

(5) Disconnect other end of flexible shaft from drive unit mounted on side of flap central drive gearbox.

(6) Remove five clamps attaching flexible shaft to structure, and remove flexible shaft.

(7) Remove two bolts attaching elevator downspring drive gearbox at bottom of flap central drive gearbox. Remove downspring drive gearbox. Temporarily reinstall two attaching bolts in central drive gearbox. Temporarily reinstall two attaching bolts in central drive gearbox case; take up extra bolt length with washers if necessary and tighten bolts.

*Applicable to Group II airplanes CV1 through CV25 and CV35 through CV37; also applicable to airplanes CV26 through CV34 after incorporation of Service Bulletin No. 27-48. For group designations, refer to Manual INTRODUCTION.


A
ELEVATOR DOWNSPRING DRIVE SCREW
SAFETY WIRE
FLEXIBLE SHAFT
AFT
B
ELEVATOR DOWNSPRING ASSEMBLY
ACCESS
FLAP CENTRAL DRIVE GEARBOX
B
FWD
FLEXIBLE DRIVE SHAFT HOUSING
DRIVE SHAFT
SAFETY WIRE
ELEVATOR DOWNSPRING DRIVE GEAR BOX
NUT
SCREW
BOLT (2)
WASHER (2)
NUT (2)
30.02.27.082

C. Install Elevator Downspring Drive.

(1) Remove two downspring drive gearbox attaching bolts from bottom of flap central drive gearbox, position downspring drive gearbox over central drive gearbox LH output shaft, and install downspring drive gearbox attaching bolts.

(2) Make sure that flap control lever is at 0° detent and that flaps are fully retracted.

(3) Position downspring flexible drive shaft and attach five mounting clamps to structure.

NOTE: In step (4) use AN960C1416L washers, as required, to provide gap of 0.005 to 0.037 inch between lock washer and face of ball joint housing.

(4) Connect flexible drive shaft to end of drive screw with detents on lock washer in notches on drive shaft retaining nut. Torque retaining nut to between 10 and 20 inch-pounds and safety lock washer.

(5) Connect end of drive shaft to downspring drive gearbox.

(6) Test elevator downspring operation (refer to Adjustment/Test Elevator Control System Functional Test).

NOTE: If the elevator downspring drive only has been replaced and no other rigging or adjustment has been changed, check elevator control system operation per 27-5-0, paragraph 2.I.

(7) Install overhead panels in hydraulic compartment, and return airplane to normal configuration.

3. Removal/Installation Elevator Downspring Position Indicator Switches (see Figure 201)

A. Equipment Required - None.

B. Remove Indicator Switches.

(1) Open ELEV. DOWN-SPRING circuit breaker on main circuit breaker panel.

(2) Disconnect indicator switch wires at terminal strip.

(3) Remove indicator switch mounting channel attaching screws and remove switches from channels.

C. Install Indicator Switches.

(1) Install switches on mounting channel.

(2) Install switch mounting channel.

NOTE: Do not tighten adjusting screws.

(3) Attach indicator switch wires to terminal block (refer to wiring diagram manual).

(4) Adjust indicator switches (refer to Adjustment/Test - Adjust Elevator Downspring Indicator Switches).

4. Adjustment/Test - Adjust Elevator Downspring Position Indicator Switches (see Figure 201)

A. Equipment Required.

(1) External source of hydraulic power.

(2) External source of electric power.

B. Adjust Indicator Switches.

(1) Move flaps to 27 degree down position (refer to Removal/Installation Elevator, Paragraph 1.C. Step (1) and move flap control handle to 27° detent).

(2) Loosen switch mounting channel attaching screws and adjust channel so that distance between centerline of roller on downspring indicator switch No. S479 and cam plate surface break line is between 0.03 and 0.09 inch.

(3) Tighten mounting channel adjusting screws.

(4) Move flap control lever to 0° detent position. Downspring position indicator on pilots' instrument panel should indicate that downspring is in cruise position.

(5) Move flap control lever to 10° and 27° detent positions. Indicator should show that elevator downspring is in takeoff position.

(6) Move flap control lever to 36° and 50° detent positions. Indicator should show downspring is in landing position.

(7) Return airplane to normal configuration.

PRESSURE BOARD RAM AIR INLET AND ANTI-ICE HEATERS - MAINTENANCE PRACTICES

1. Removal/Installation - Pressure Board Ram Air Inlet and Anti-Ice Heaters

A. General.

The pressure board ram air inlets are located on the leading edge of the horizontal stabilizers.

B. Equipment Required.

(1) Strap wrench.

C. Remove Pressure Board Ram Air Inlet and Anti-Ice Heater.

(1) Open BAL BOARD INLET ANTI-ICE LH or RH circuit breaker on main circuit breaker panel.

(2) Remove small access panel on lower surface of stabilizer leading edge just aft of ram air inlet.

(3) Loosen forward clamp on ram air inlet visible through access panel opening.

(4) Cut electrical wires leading from electrical harness to anti-ice heater.

(5) Remove six screws attaching ram air inlet to inlet housing protruding from leading edge of stabilizer.

(6) Using strap wrench, loosen ram air inlet and remove through inlet housing.

D. Install Pressure Board Ram Air Inlet and Anti-Ice Heater.

(1) Position ram air inlet in inlet housing and slide aft end of inlet duct into flexible coupling.

(2) Install six screws attaching ram air inlet to inlet housing.

(3) Tighten clamp securing ram air inlet duct in flexible coupling.

(4) Splice heater electrical wires which were cut in step C (4).

(5) Install access panel on lower surface of stabilizer leading edge.

(6) Close circuit breaker opened in step C (1).

(7) Test pressure board anti-ice heaters (refer to Chapter 30, ICE AND RAIN PROTECTION, Adjustment/Test - Pressure Board Air Inlet Anti-Ice Heaters).

HORIZONTAL STABILIZER TRIM SYSTEM - DESCRIPTION AND OPERATION

1. General

An adjustable stabilizer provides the large moments necessary for trimming the airplane at takeoff and landing speeds and results in an aerodynamically clean configuration at cruising speeds. The stabilizer pivots on pivot bearings about a spindle mounted in fuselage fittings, one on each side of the fuselage in the tail cone area of the airplane. The stabilizer attach fittings are located on brackets near the stabilizer rear spar. An adjustable screw jack actuator connects the front spar of the stabilizer and the fuselage beams in the floor of the tail cone section, and serves as a means of adjusting the angle of incidence of the stabilizer.

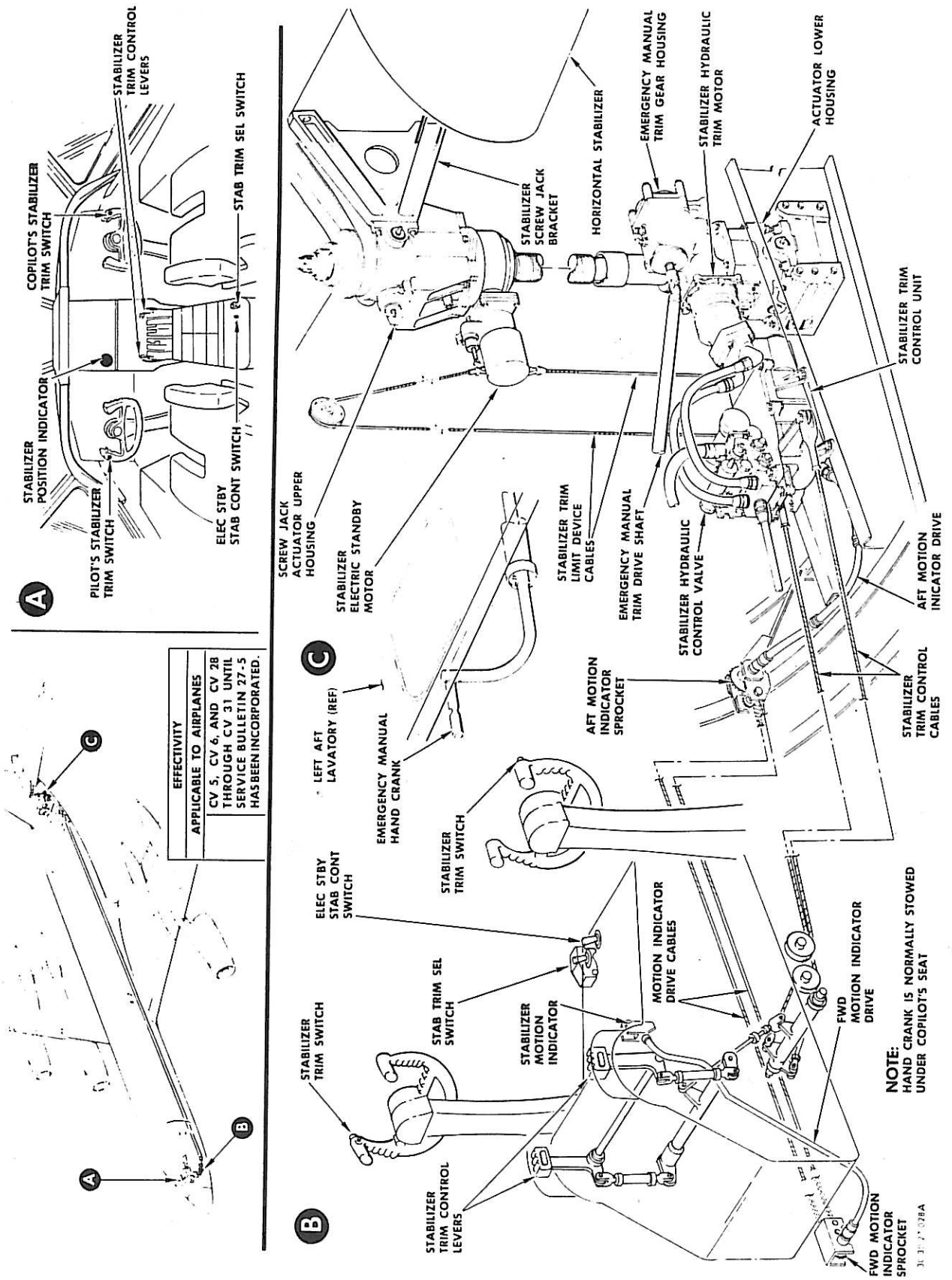
In the normal mode of operation, the stabilizer is positioned by two trim levers, one on each side of the pilots' pedestal, or by trim switches located on the outboard horns of the control wheels. In the emergency mode, the stabilizer is adjusted by a standby stabilizer control switch on the pilots' pedestal or by manually turning the emergency trim crank in the aft left-hand lavatory compartment. The normal and emergency trim systems are shown in Figure 1.

The Mach trim augmentation system adjusts the stabilizer automatically to counteract the tendency of the airplane to become "nose heavy" at high airspeeds. The rate of stabilizer deflection depends on the trim mode and on whether the autopilot is engaged.

The trim position of the stabilizer is indicated by a stabilizer trim indicator on the pilots' instrument panel. A stabilizer motion indicator on the forward LH side of the pilots' pedestal gives a visible and audible indication of any change in stabilizer setting.

2. Horizontal Stabilizer

The horizontal stabilizer consists of an interspar box-beam assembly, an electrically de-iced leading edge, and a trailing edge structure with shroud doors. The right and left stabilizer sections are bolted to a torque box in the tail cone section of the fuselage. The complete stabilizer assembly pivots about a fuselage mounted spindle that extends completely through and protrudes outboard from each side of the fuselage. A pivot bearing bolted to a pivot fitting in the inboard rib of each stabilizer section provides the bearing surface between the stabilizer and the fuselage spindle.



Horizontal Stabilizer Trim System
Figure 1 (Sheet 1 of 2)

A
PILOT'S STABILIZER TRIM SWITCH
STABILIZER POSITION INDICATOR
COPILOT'S STABILIZER TRIM SWITCH
STABILIZER TRIM CONTROL LEVERS
ELEC STBY STAB CONT SWITCH
STAB TRIM SEL SWITCH
EFFECTIVITY
APPLICABLE TO AIRPLANES
CV 1 THROUGH CV 4, CV 7 THROUGH CV 27, AND CV 32 AND ON. ALSO APPLICABLE TO AIRPLANES CV 5, CV 6, AND CV 28 THROUGH CV 31 AFTER SERVICE BULLETIN 27-5 HAS BEEN INCORPORATED.
C
SCREW JACK ACTUATOR UPPER HOUSING
STABILIZER SCREW JACK BRACKET
HORIZONTAL STABILIZER
EMERGENCY MANUAL TRIM GEAR HOUSING
STABILIZER HYDRAULIC TRIM MOTOR
ACTUATOR LOWER HOUSING
STABILIZER TRIM CONTROL UNIT
STABILIZER ELECTRIC STANDBY MOTOR
STABILIZER TRIM LIMIT DEVICE CABLES
EMERGENCY MANUAL TRIM DRIVE SHAFT
STABILIZER HYDRAULIC CONTROL VALVE
LEFT AFT LAVATORY (REF)
EMERGENCY MANUAL HAND CRANK
STABILIZER TRIM CONTROL CABLES
STABILIZER TRIM SWITCH
ELEC STBY STAB CONT SWITCH
MOTION INDICATOR DRIVE CABLES
STAB TRIM SEL SWITCH
STABILIZER MOTION INDICATOR
STABILIZER TRIM SWITCH
FWD MOTION INDICATOR DRIVE
NOTE: HAND CRANK IS NORMALLY STOWED UNDER COPILOT'S SEAT
B
STABILIZER TRIM CONTROL LEVERS
FWD MOTION INDICATOR SPROCKET
30.02.27.203

3. Horizontal Stabilizer Actuator

The horizontal stabilizer actuator consists essentially of an acme threaded jack screw, an upper housing attached through a gimbal to the front spar of the torque box and a lower housing mounted on two beams in the floor of the tail cone section of the airplane (see Figure 2). The upper housing contains a floating acme nut threaded on the jack screw and is connected by an irreversible worm gear with an electric motor mounted on the forward side of the upper housing.

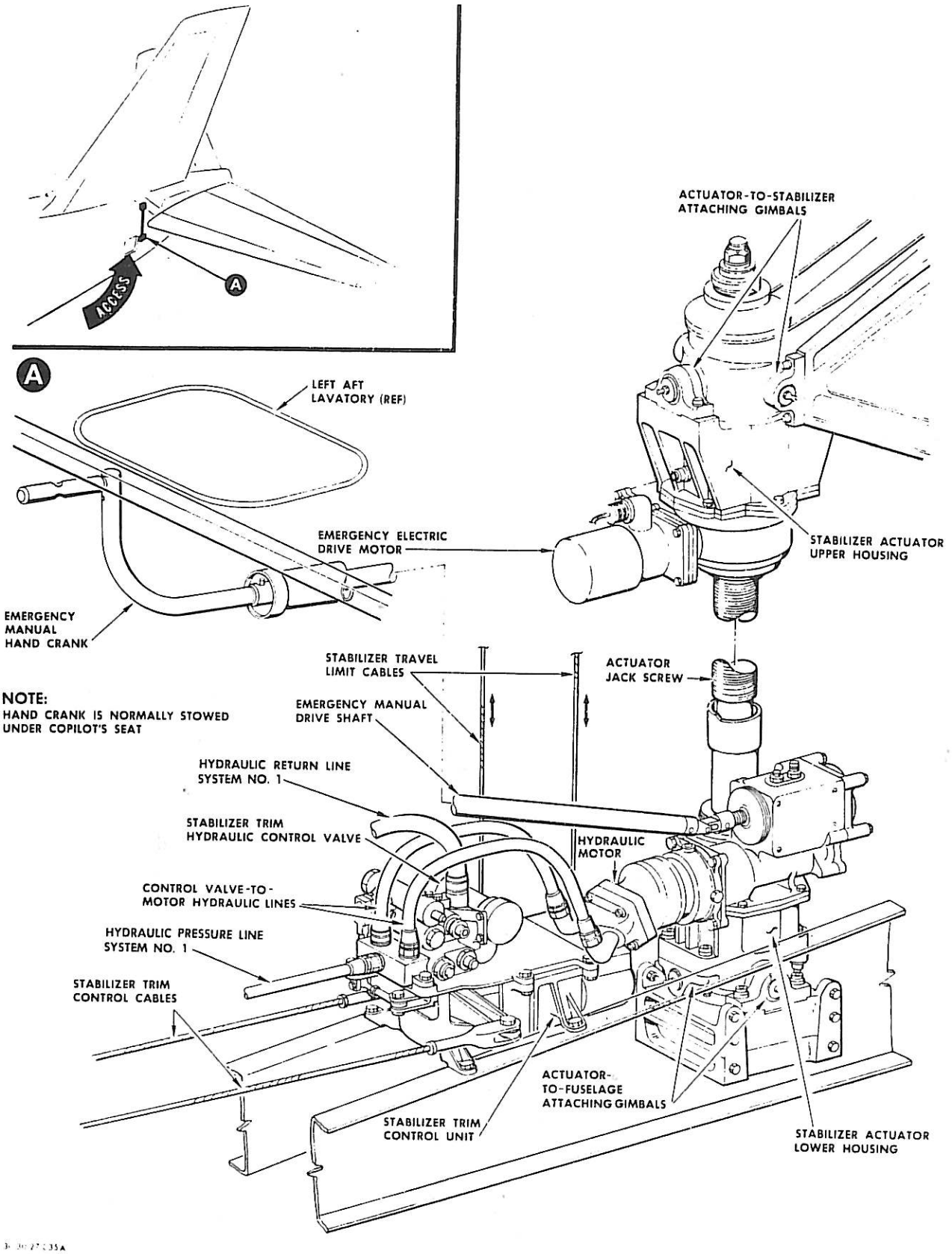
The lower housing contains the hydraulic motor, which is the primary actuator drive, and a shaft and gear train for the emergency manual operation of the actuator.

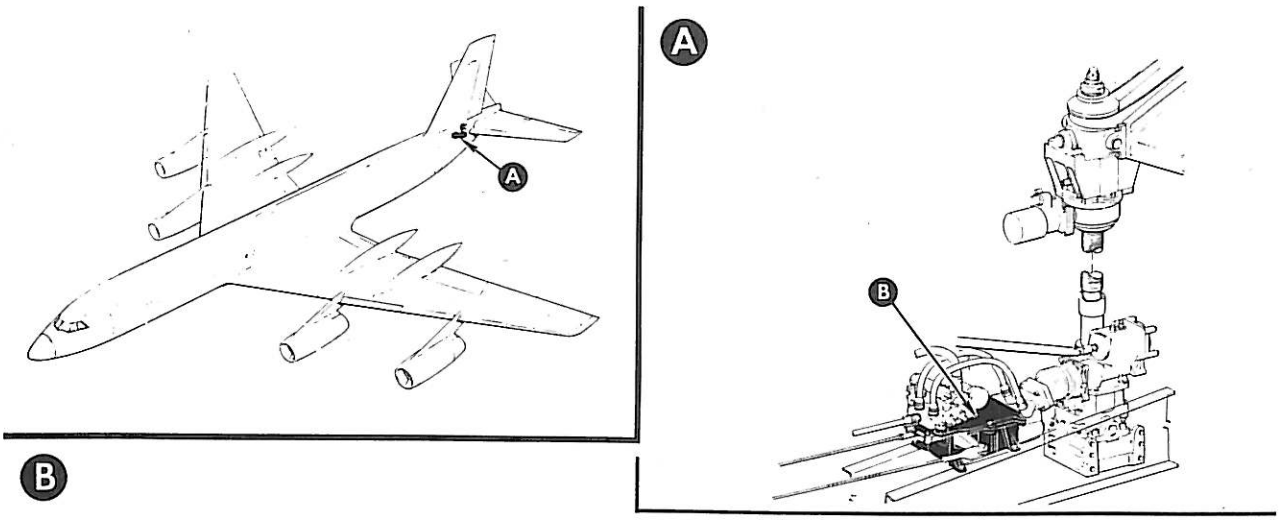
Movement of the stabilizer actuator raises or lowers the leading edge of the horizontal stabilizer to longitudinally trim the airplane. The horizontal stabilizer may be trimmed hydraulically, electrically, or manually. Hydraulic pressure from system number one is routed through a control valve to the hydraulic motor on the actuator. The control valve may be actuated manually by the trim levers on the pilots' pedestal or electrically by the trim switches on the outboard horn of the pilots' control wheels. The autopilot and the Mach trim augmentation system also function through the electrical portion of the hydraulic control valve. Emergency electrical control of the actuator is through the electric motor on the upper housing which turns the acme nut through an irreversible worm reduction gear. The electric motor is controlled by the ELECT STDBY STAB CONT switch on the pilots' pedestal. Emergency manual trim is provided in case the electrical and hydraulic systems should fail. Emergency manual trim is accomplished by turning the drive shaft which turns the jack screw in the acme threaded nut in the screw jack upper housing, thus raising or lowering the horizontal stabilizer leading edge.

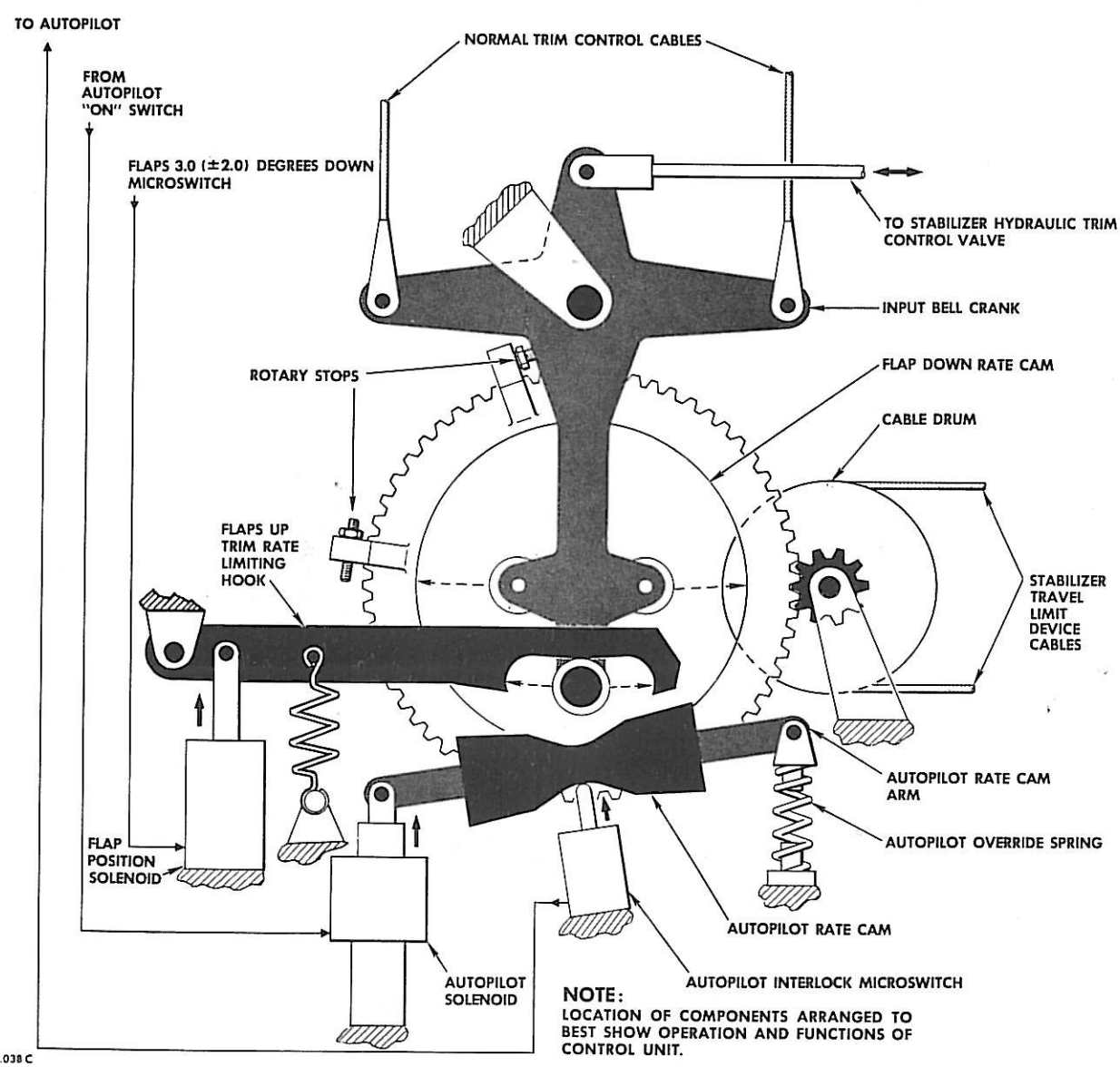
4. Horizontal Stabilizer Control Unit

The horizontal stabilizer control unit is mounted at floor level immediately forward of the horizontal stabilizer actuator (see Figure 3). Cables connect the trim levers on the pilots' control pedestal to the input bell crank on the control unit. Movement of the trim levers actuates the control unit bell crank which, through an additional linkage, operates the hydraulic control valve and regulates hydraulic pressure to the hydraulic motor on the stabilizer actuator.

The control unit regulates the hydraulic actuated trim rate of the horizontal stabilizer to three speeds. Two trim rate speeds are controlled by the position of the flaps, and the third trim rate speed is controlled by the autopilot. A switch, actuated by the flap linkage at 3.0(±2.0) degrees of flap extension, energizes a solenoid mounted on the control unit. The solenoid actuates a trim rate limiting hook which disengages the input bell crank lower roller to increase trim rate. Normally the solenoid is deenergized; the hook device is spring-loaded to the input bell crank lower roller and the trim rate is limited.


ACCESS
A
A
LEFT AFT LAVATORY (REF)
EMERGENCY ELECTRIC DRIVE MOTOR
EMERGENCY MANUAL HAND CRANK
ACTUATOR-TO-STABILIZER ATTACHING GIMBALS
STABILIZER ACTUATOR UPPER HOUSING
NOTE:
HAND CRANK IS NORMALLY STOWED UNDER COPILOT'S SEAT
STABILIZER TRAVEL LIMIT CABLES
ACTUATOR JACK SCREW
EMERGENCY MANUAL DRIVE SHAFT
HYDRAULIC RETURN LINE SYSTEM NO. 1
STABILIZER TRIM HYDRAULIC CONTROL VALVE
HYDRAULIC MOTOR
CONTROL VALVE-TO-MOTOR HYDRAULIC LINES
HYDRAULIC PRESSURE LINE SYSTEM NO. 1
STABILIZER TRIM CONTROL CABLES
ACTUATOR-TO-FUSELAGE ATTACHING GIMBALS
STABILIZER TRIM CONTROL UNIT
STABILIZER ACTUATOR LOWER HOUSING


A
B


TO AUTOPILOT
FROM AUTOPILOT "ON" SWITCH
FLAPS 3.0 (±2.0) DEGREES DOWN MICROSWITCH
NORMAL TRIM CONTROL CABLES
TO STABILIZER HYDRAULIC TRIM CONTROL VALVE
INPUT BELL CRANK
ROTARY STOPS
FLAP DOWN RATE CAM
CABLE DRUM
FLAPS UP TRIM RATE LIMITING HOOK
STABILIZER TRAVEL LIMIT DEVICE CABLES
AUTOPILOT RATE CAM ARM
AUTOPILOT OVERRIDE SPRING
FLAP POSITION SOLENOID
AUTOPILOT RATE CAM
AUTOPILOT SOLENOID
AUTOPILOT INTERLOCK MICROSWITCH
NOTE:
LOCATION OF COMPONENTS ARRANGED TO BEST SHOW OPERATION AND FUNCTIONS OF CONTROL UNIT.
30.30.27.038 C

Engaging the autopilot energizes a solenoid mounted on the control unit which actuates the autopilot rate cam arm. The arm is moved to cause a groove in the autopilot rate cam to engage the lower roller of the control unit input bell crank and limit stabilizer trim rate An autopilot interlock microswitch is also actuated by the autopilot rate cam arm. The autopilot circuit is closed by the interlock microswitch when the autopilot solenoid is energized and opened when the solenoid is deenergized, thus providing a safety feature should the solenoid fail. A spring device on the opposite end of the autopilot rate cam arm from the autopilot solenoid allows the autopilot trim rate to be overriden by normal manual control.

5. Horizontal Stabilizer Hydraulic Control Valve

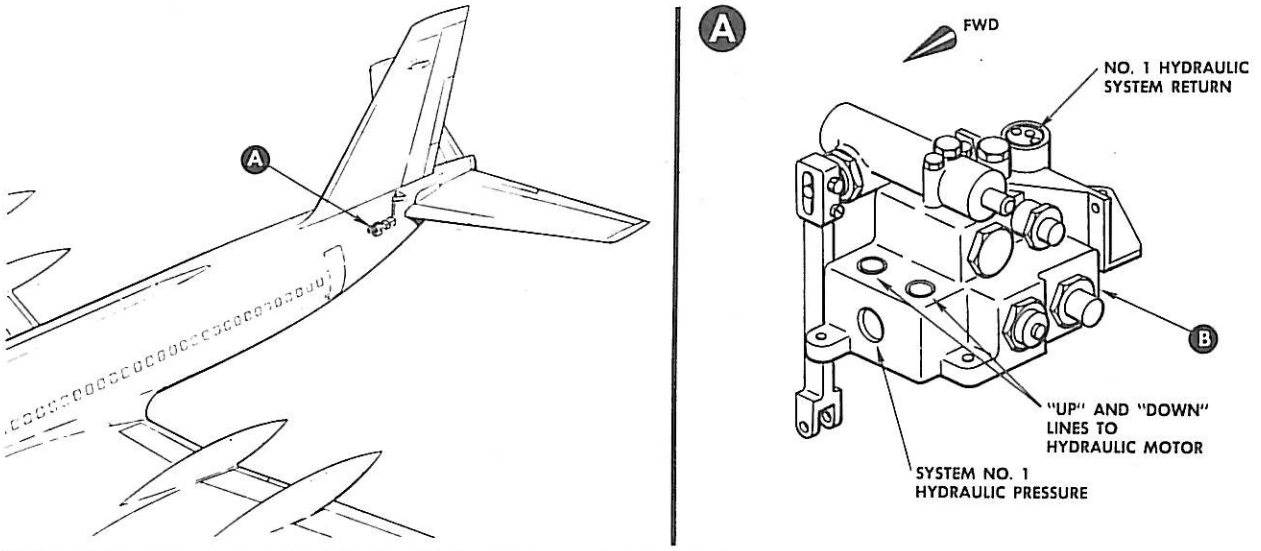
The control valve is mounted on the stabilizer control unit (see Figure 4). The valve regulates the amount and direction of fluid flow to the actuator hydraulic motor and thereby controls the stabilizer trim rate and direction of travel. Hydraulic flow through the valve is controlled manually by the stabilizer control unit or electrically by the normal electric trim system and the Mach trim augmentation system. The autopilot operates the control valve through the normal electric trim system.

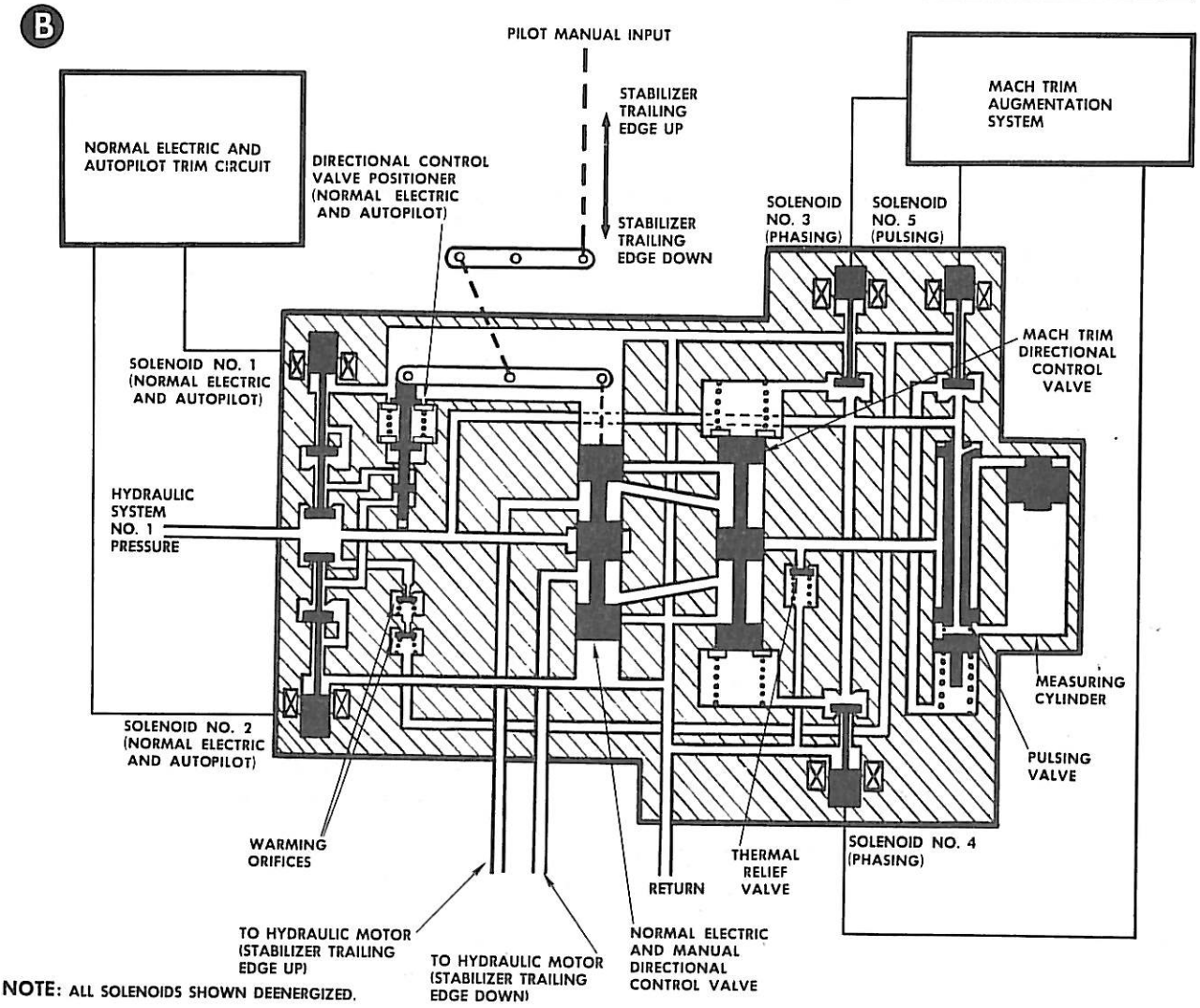
Manual movement of the normal control trim levers actuates the input bell crank on the control unit and the bell crank through linkage directs the quantity and direction of hydraulic fluid flow through the hydraulic control valve (see Figure 5). Actuation of the electric control switch on either pilot's control wheel directs electrical power to solenoids in the boost section of the control valve. Energizing the solenoids routes fluid through the control valve to the stabilizer trim hydraulic motor. Electrical actuation of the hydraulic control valve causes a movement of the normal manual control linkage causing movement of the normal trim control levers in the flight compartment. Safety precautions must be practiced to guard against the use of electrical trim switches when the stabilizer is being trimmed manually. The autopilot control is connected to the normal electric control system.

The Mach trim augmentation system directs electrical signals (step or pulse voltage) to the Mach trim portion of the valve. This portion of the valve also regulates the direction and amount of hydraulic fluid flow to the stabilizer hydraulic motor.

6. Normal Stabilizer Trim System

During normal operation, the stabilizer is trimmed by trim lever movement or actuation of the trim switch on either pilots' control wheel. (see Figure 6). The trim levers on the pilots' control pedestal are connected by a cable system to a bell crank on the control unit just forward of the stabilizer actuator. The input bell crank in the control unit is actuated by the trim levers, the bell crank in turn operates the hydraulic control valve and regulates hydraulic pressure to the hydraulic motor on the stabilizer actuator. The trim levers are centered by springs in the hydraulic control valve and a centering spring device mounted on the control unit. Returning the levers to neutral stops stabilizer trim action.

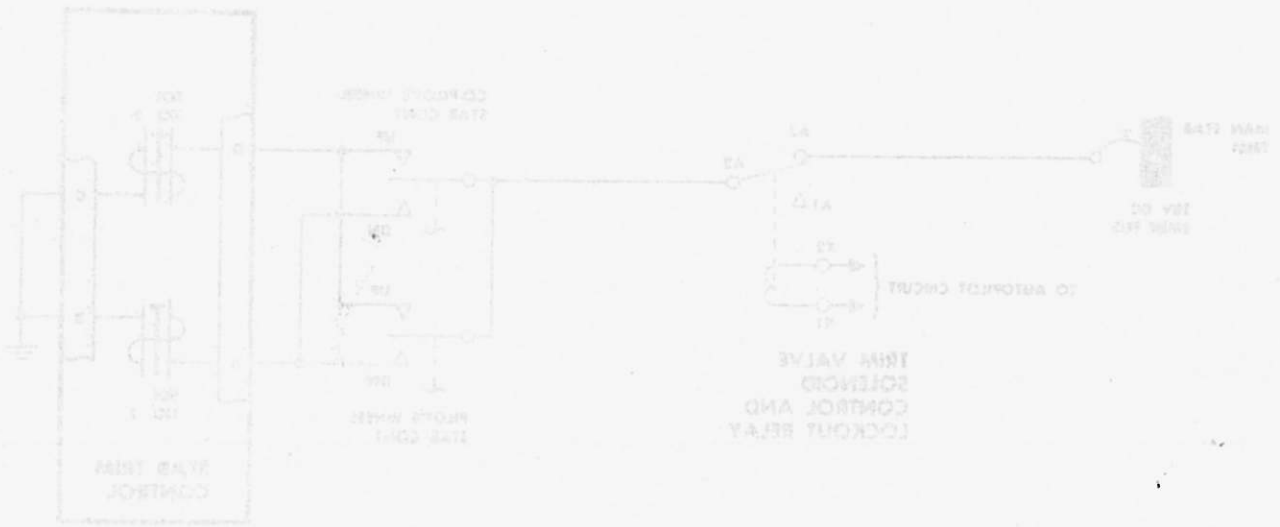




NOTE: ALL SOLENOIDS SHOWN DEENERGIZED.

30.30.27.037

Horizontal Stabilizer Control Valve Schematic
Figure 4



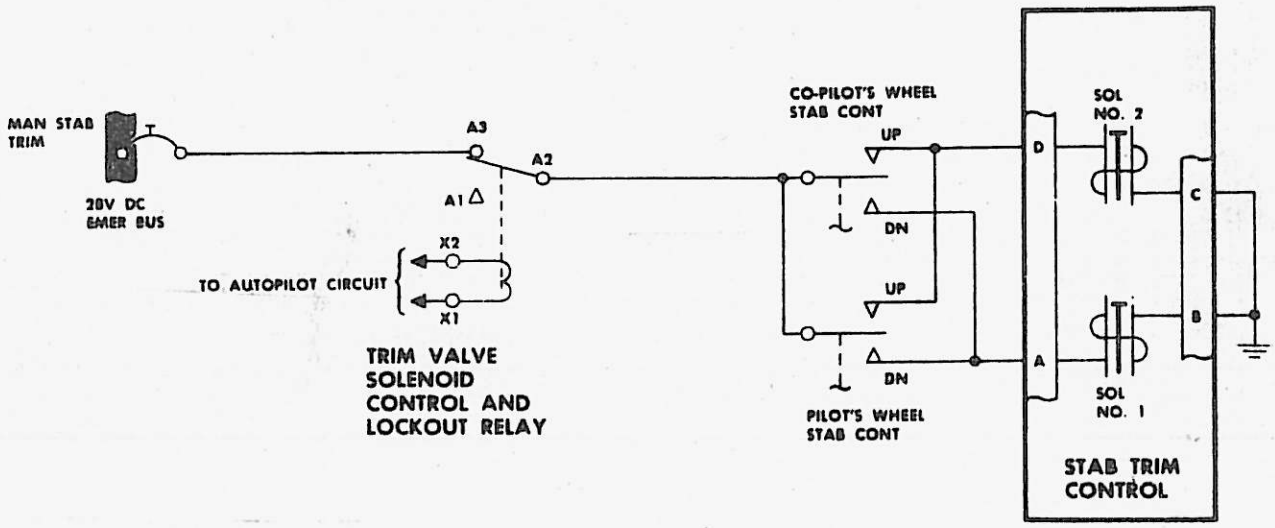
TEMPORARY REVISION NO. 27-52.

Insert facing 27-6-0, Page 11, dated Feb. 15/63 (or subsequent).

The illustration on this temporary revision is to be used for airplanes not modified per Service Bulletin No. 27-11.

For airplanes that have been modified per Service Bulletin No. 27-11, use the illustration on 27-6-0, Page 11.

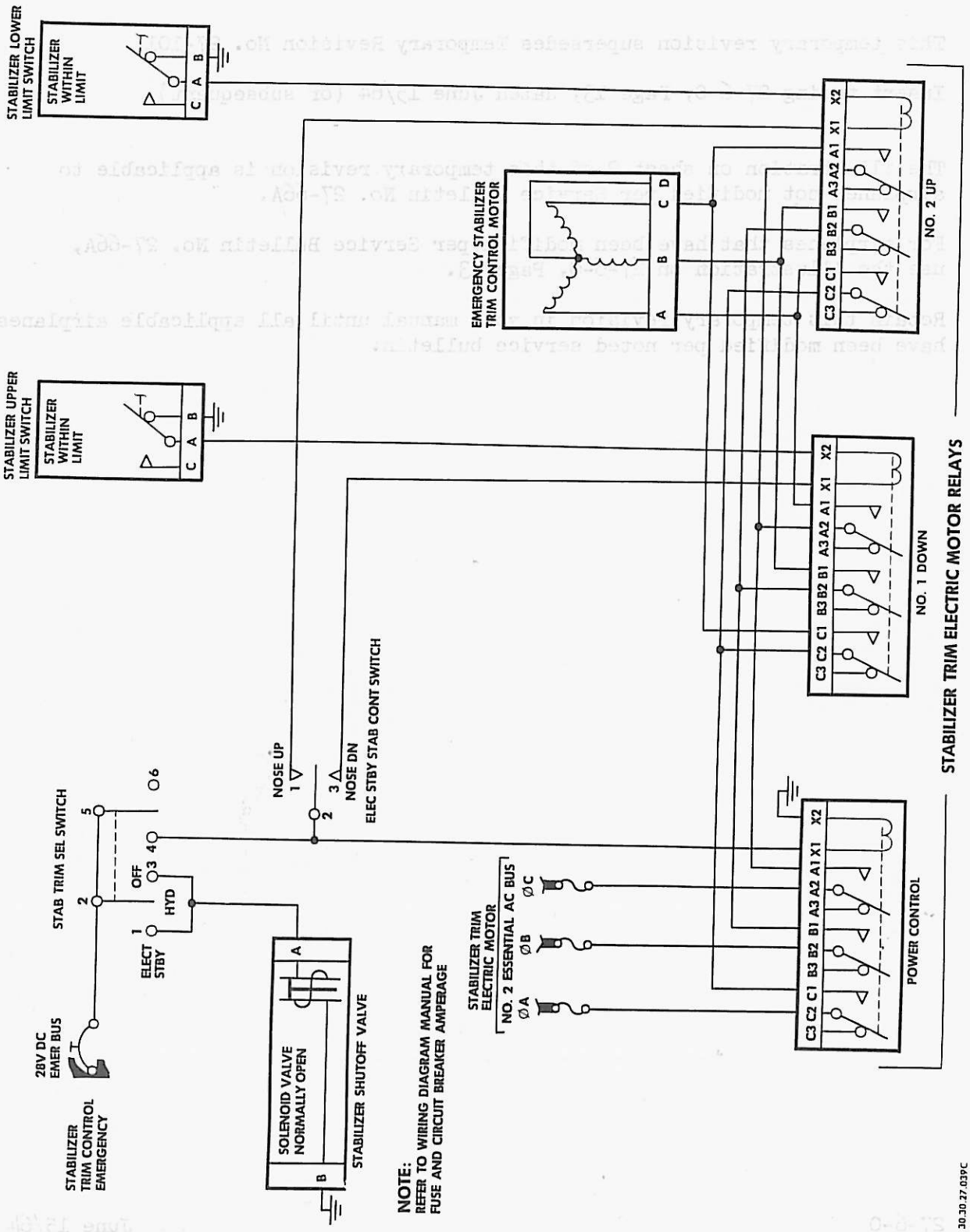
Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.



NOTE:
REFER TO WIRING DIAGRAM MANUAL FOR FUSE AND CIRCUIT BREAKER AMPERAGES.

30.02.27.110 TR

Stabilizer Electric Trim System
Schematic
Figure 6


STABILIZER LOWER LIMIT SWITCH
STABILIZER WITHIN LIMIT
C A B
STABILIZER UPPER LIMIT SWITCH
STABILIZER WITHIN LIMIT
C A B
EMERGENCY STABILIZER TRIM CONTROL MOTOR
A B C D
NO. 2 UP
NO. 1 DOWN
C3 C2 C1 B3 B2 B1 A3 A2 A1 X1 X2
STABILIZER TRIM ELECTRIC MOTOR RELAYS
POWER CONTROL
NOSE UP
1
NOSE DN
3
2
ELEC STBY STAB CONT SWITCH
STAB TRIM SEL SWITCH
5
2
1
OFF
3
HYD
ELECT STBY
4
O6
28V DC EMER BUS
STABILIZER TRIM CONTROL EMERGENCY
SOLENOID VALVE NORMALLY OPEN
A
B
STABILIZER SHUTOFF VALVE
STABILIZER TRIM ELECTRIC MOTOR
NO. 2 ESSENTIAL AC BUS
ØA
ØB
ØC
NOTE:
REFER TO WIRING DIAGRAM MANUAL FOR FUSE AND CIRCUIT BREAKER AMPERAGE
30.30.27.039C

TEMPORARY REVISION NO. 27-104

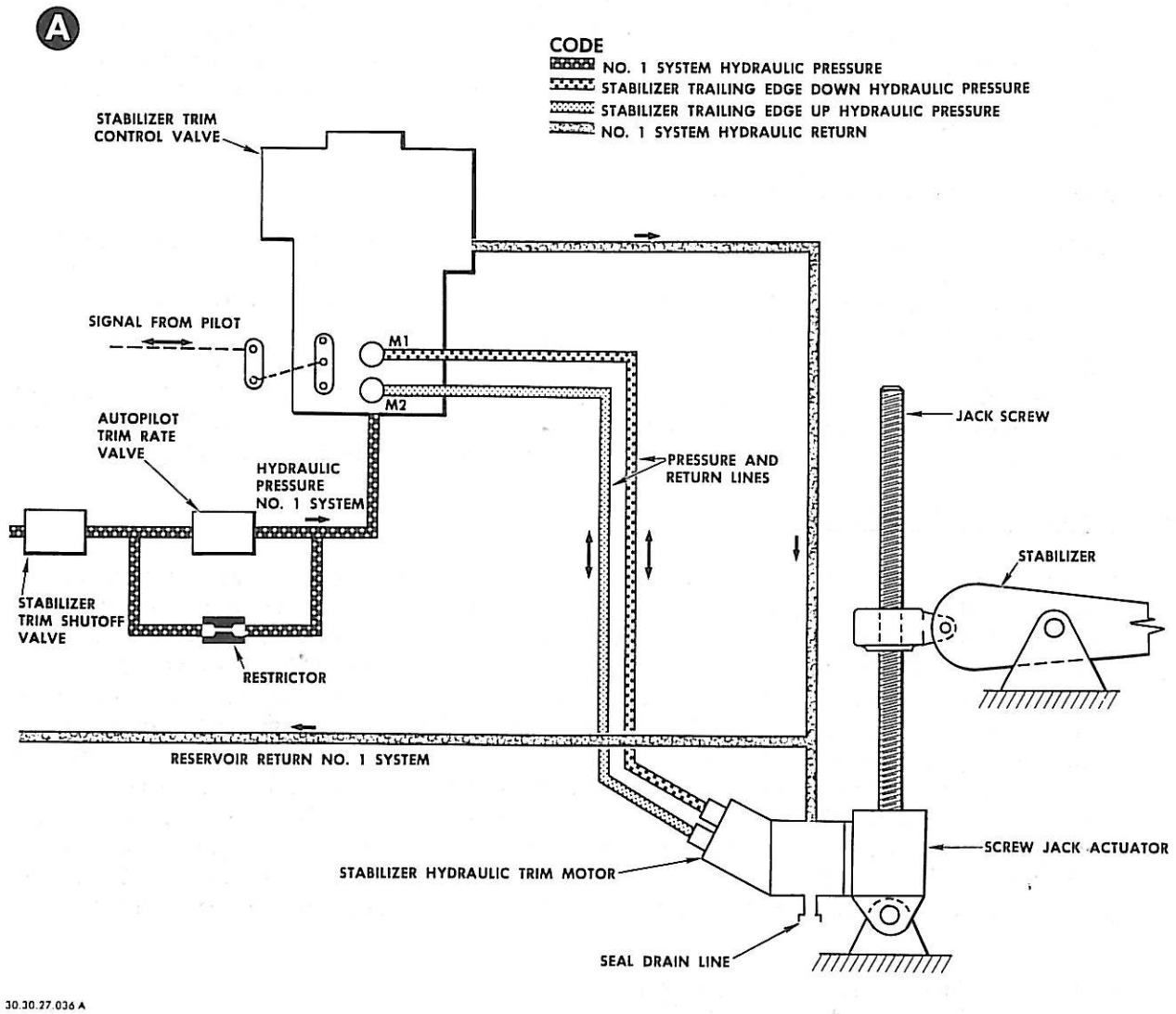
This temporary revision supersedes Temporary Revision No. 27-101.

Insert facing 27-6-0, Page 13, dated June 15/64 (or subsequent).

The illustration on sheet 2 of this temporary revision is applicable to airplanes not modified per Service Bulletin No. 27-66A.

For airplanes that have been modified per Service Bulletin No. 27-66A, use the illustration on 27-6-0, Page 13.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.


A
CODE
NO. 1 SYSTEM HYDRAULIC PRESSURE
STABILIZER TRAILING EDGE DOWN HYDRAULIC PRESSURE
STABILIZER TRAILING EDGE UP HYDRAULIC PRESSURE
NO. 1 SYSTEM HYDRAULIC RETURN
STABILIZER TRIM CONTROL VALVE
SIGNAL FROM PILOT
M1
M2
AUTOPILOT TRIM RATE VALVE
HYDRAULIC PRESSURE NO. 1 SYSTEM
PRESSURE AND RETURN LINES
JACK SCREW
STABILIZER
STABILIZER TRIM SHUTOFF VALVE
RESTRICTOR
RESERVOIR RETURN NO. 1 SYSTEM
SCREW JACK ACTUATOR
STABILIZER HYDRAULIC TRIM MOTOR
SEAL DRAIN LINE
30.30.27.036 A

Normal electrical trim is accomplished by actuation of the stabilizer trim switch on the outboard horn of either pilot's control wheel. The trim switches actuate the hydraulic boost stage in the control valve, which directs hydraulic pressure to the hydraulic motor to drive the jack screw.

7. Normal Trim System Control Levers

A pilot's and copilot's normal stabilizer trim control lever is located on each side of the pilots' pedestal (see Figure 1). The trim levers are mounted on a common shaft which actuates a bell crank. Cables are routed aft from the bell crank to the input bell crank on the control unit.

Forward movement of the control levers raises the leading edge of the horizontal stabilizer and lowers the nose of the airplane. Moving the control levers aft lowers the leading edge of the stabilizer and raises the nose of the airplane. The stabilizer position indicator on the instrument panel indicates stabilizer position and movement.

8. Normal Electric Trim Control

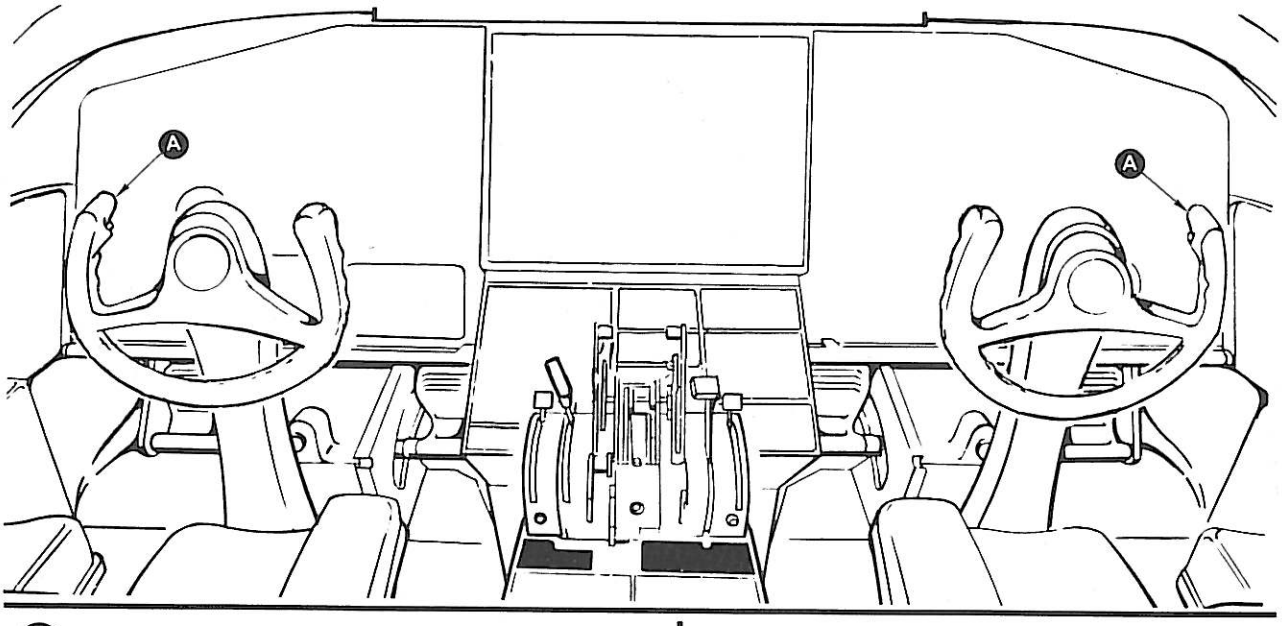
During normal operation, stabilizer trim is regulated by means of a trim switch located on a knob near the top of the outboard horn of each control wheel (see Figure 6). This switch controls the hydraulic boost stage of the hydraulic control valve, which directs hydraulic pressure to the actuator hydraulic motor. The boost stage of the control valve actuates the entire normal manual trim linkage and the normal trim control levers respond to the electrical actuation. Precautions must be used to guard against use of the electrical authority when an operator is trimming manually.

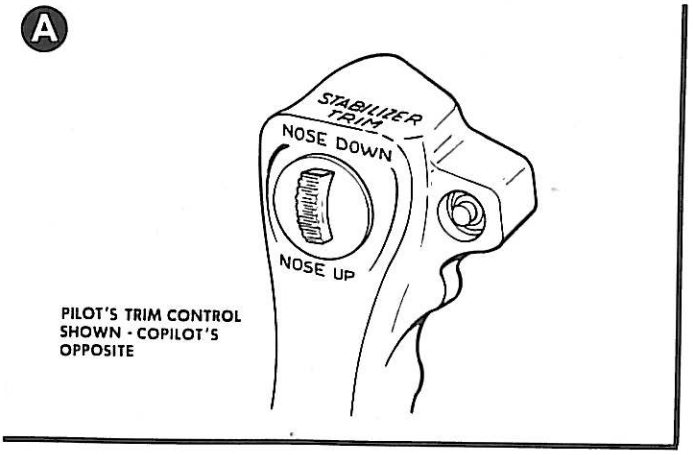
9. Autopilot Trim Control

Engaging the autopilot switches autopilot trim into the normal electrical trim circuit and actuates the boost stage of the hydraulic control valve. Autopilot longitudinal trim is noticeable in the flight compartment by visual and audible indication of the stabilizer motion indicator, small manual trim control lever movement, and movement of the needle on the sub-dial on the stabilizer position indicator. The rate of stabilizer trim under autopilot control is regulated by a cam arrangement in the stabilizer control unit during normal operation. A normally-open solenoid operated, autopilot controlled hydraulic valve is installed in the stabilizer hydraulic pressure line as a secondary means of regulating stabilizer autopilot trim rate. Autopilot control may be overriden by normal manual trim at the pilots' discretion. Normal electric trim is "locked out" during autopilot operation.

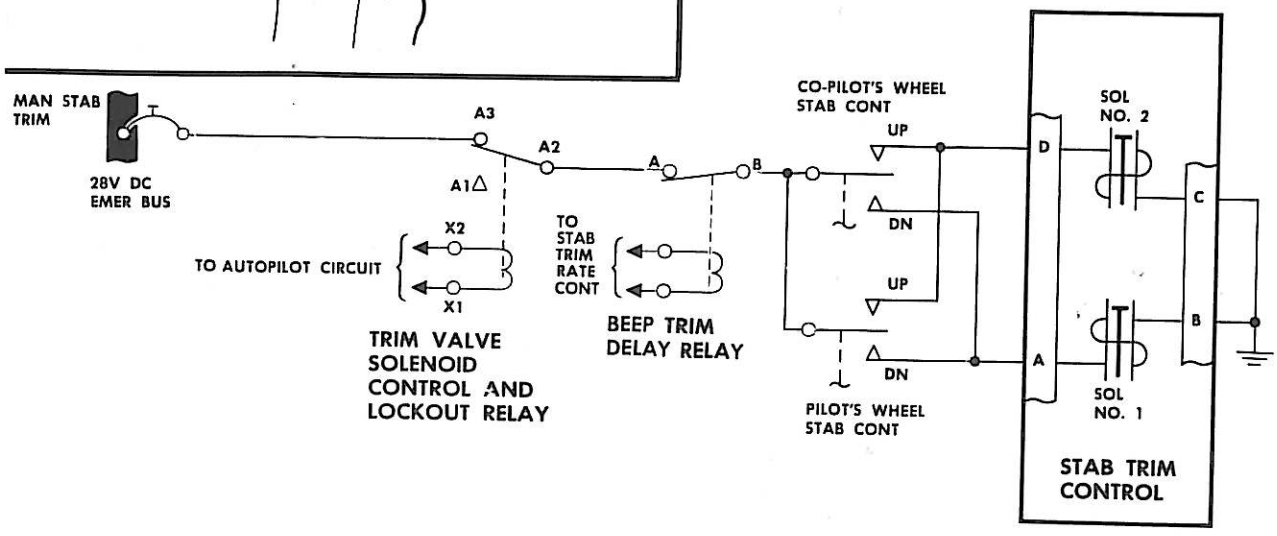
10. Emergency Stabilizer Trim Systems

In case of hydraulic pressure loss in the number one hydraulic system, or other malfunction of the normal stabilizer trim mechanism, the stabilizer can be adjusted by using the electrical or manual emergency systems. In the emergency electrical system the stabilizer screw jack actuator is driven by an electric motor mounted on the actuator upper housing. Without electrical or hydraulic power available, the stabilizer may be trimmed by manually turning the drive shaft to the gear train in the lower housing of the stabilizer actuator.





NOTE:
REFER TO WIRING DIAGRAM MANUAL FOR FUSE AND CIRCUIT BREAKER AMPERAGE.



30.02.27.1108

Stabilizer Electric Trim System Schematic
Figure 6

11. Emergency Electric Trim System

If electric power is available, the airplane can be trimmed by an electric motor mounted on the upper housing of the stabilizer actuator (see Figure 7). The operation and direction of rotation of the electric motor is controlled by a momentary-contact ELEC STDBY STAB CONT switch located on the aft right-hand side of the pilots' pedestal. The forward position is placarded NOSE DN; the aft position is placarded NOSE UP. Holding the switch in the forward position tends to lower the nose of the airplane; holding the switch in the aft position tends to raise the nose of the airplane. Before the electric emergency trim system can be used, the STAB TRIM SEL switch on the pilots' pedestal must be positioned to ELEC STDBY to arm the ELEC STDBY STAB CONT switch and STAB TRIM ELEC MOTOR PWR CONTROL relay and close the hydraulic shutoff valve in the pressure line to the stabilizer trim control valve. Limit switches determine stabilizer travel in the emergency electric system.

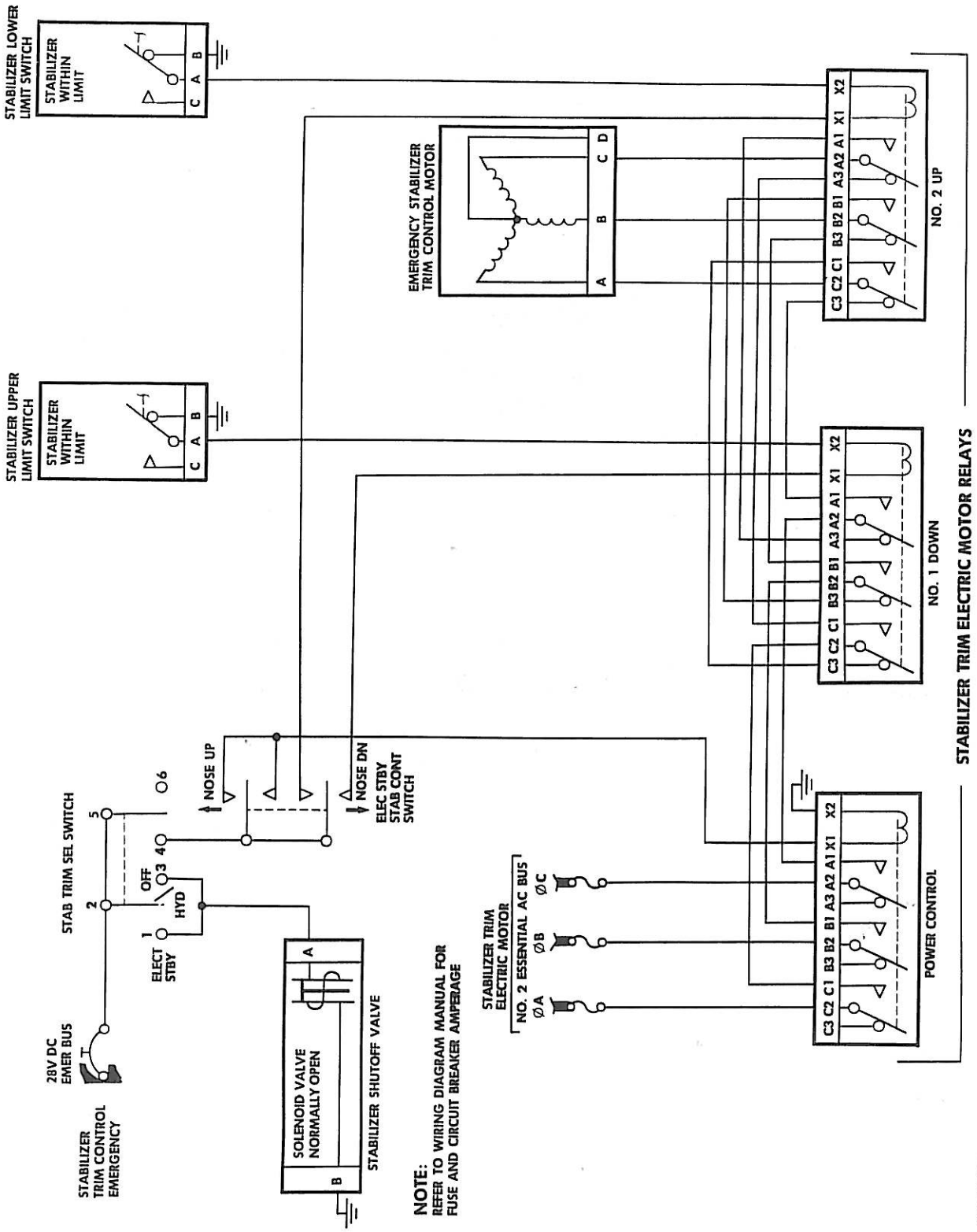
12. Emergency Manual Trim System

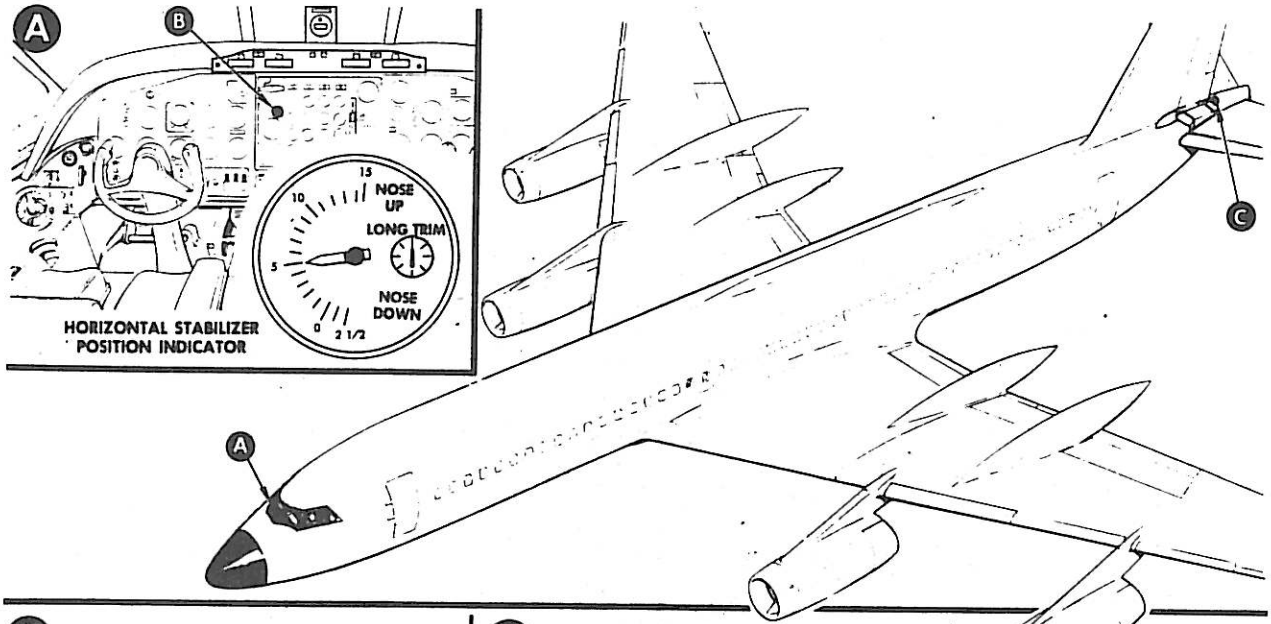
In case of both electric and hydraulic power failure, the airplane can still be trimmed manually with the hand crank which is stowed under the copilot's seat. Before manually actuating the stabilizer actuator, the STAB TRIM SEL switch must be in the ELEC STBY position and the lock pin from the hand crank inserted in the pilot's normal trim control lever. Access to the manual drive shaft is gained through provisions in the left aft lavatory. The manual drive shaft access is behind an escutcheon plate on the wash basin counter apron. The drive is engaged by removing the plate, inserting the handcrank and pushing the shaft into engagement with the stabilizer actuator drive. The operator of the handcrank must establish interphone communication with the pilot and rotate the handcrank under the pilots orders to trim the stabilizer. Clockwise rotation of the hand crank tends to lower the nose of the airplane and counterclockwise rotation tends to raise the nose of the airplane. Approximately 600 turns of the hand crank are required to trim the stabilizer through its full range of travel.

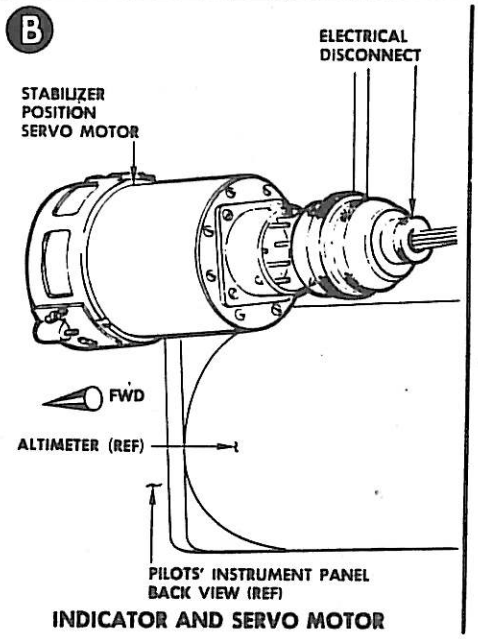
Since the manual emergency drive shaft engages directly to the hydraulic motor gear train, safety precautions must be practiced to guard against hydraulic power being applied while the handcrank is installed and in use. When emergency manual operation is discontinued, the drive shaft must be disengaged from the actuator. The engagement slot in the shaft is constructed to permit the required breakout pull to be applied to the handcrank. When disengaged, the drive shaft is easily rotated and axial motion of the shaft is locked in the forward detent position.

13. Stabilizer Position Transmitter and Indicator

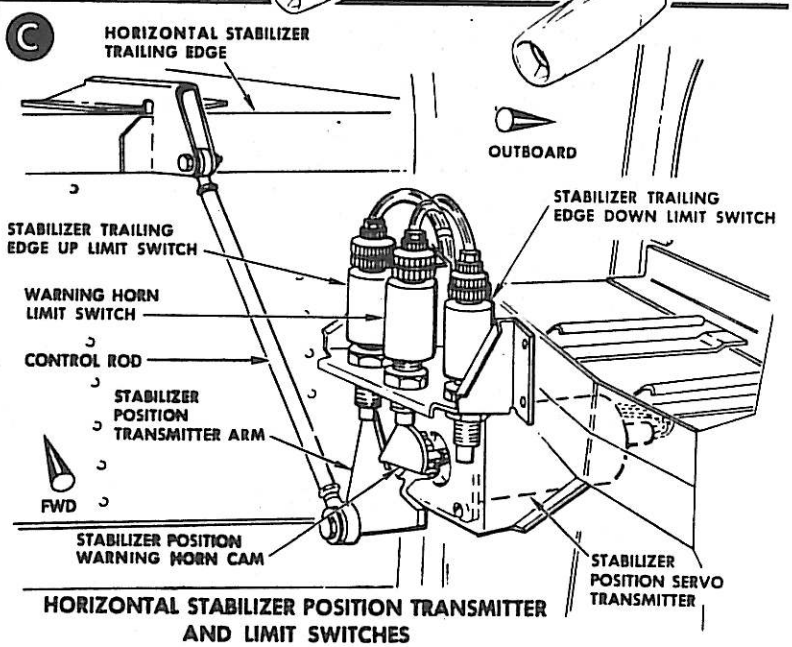
A stabilizer position indicator on the pilots' instrument panel indicates the trim position of the horizontal stabilizer. The pointer of this indicator is positioned by an attached synchro motor synchronized with a synchro transmitter mounted on the right drag longeron in the tail cone of the airplane. An arm on the input shaft of the synchro motor is connected by a push-pull rod to the rear spar of the stabilizer (see Figure 8).


STABILIZER LOWER LIMIT SWITCH
STABILIZER WITHIN LIMIT
C A B
STABILIZER UPPER LIMIT SWITCH
STABILIZER WITHIN LIMIT
C A B
EMERGENCY STABILIZER TRIM CONTROL MOTOR
A B C D
NO. 2 UP
C3 C2 C1 B3 B2 B1 A3 A2 A1 X1 X2
NO. 1 DOWN
C3 C2 C1 B3 B2 B1 A3 A2 A1 X1 X2
POWER CONTROL
C3 C2 C1 B3 B2 B1 A3 A2 A1 X1 X2
STABILIZER TRIM ELECTRIC MOTOR RELAYS
NO. 2 ESSENTIAL AC BUS
ØA ØB ØC
STABILIZER TRIM ELECTRIC MOTOR
NOSE UP
NOSE DN
ELEC STBY STAB CONT SWITCH
STAB TRIM SEL SWITCH
5 6 4 3 2 1
OFF
HYD
ELECT STBY
28V DC EMER BUS
STABILIZER TRIM CONTROL EMERGENCY
SOLENOID VALVE NORMALLY OPEN
A B
STABILIZER SHUTOFF VALVE
NOTE:
REFER TO WIRING DIAGRAM MANUAL FOR FUSE AND CIRCUIT BREAKER AMPERAGE
30.30.27.039E

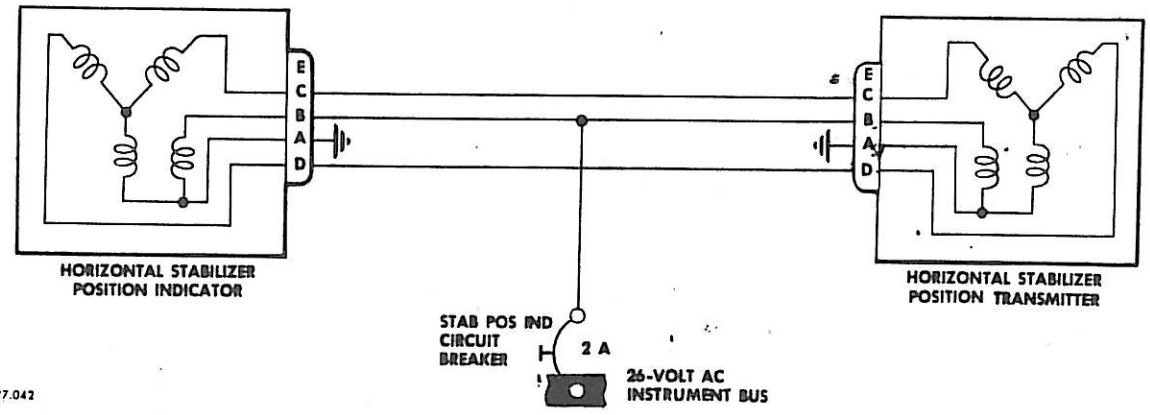




INDICATOR AND SERVO MOTOR



HORIZONTAL STABILIZER POSITION TRANSMITTER AND LIMIT SWITCHES



Stabilizer Position Indicator System
Figure 8

TEMPORARY REVISION NO. 27-53.

Insert facing 27-6-0, Page 17, dated Feb. 15/63 (or subsequent).

The instructions in this temporary revision are to be used for airplanes not modified per Service Bulletin No. 27-11.

For airplanes that have been modified per Service Bulletin No. 27-11, use the instructions in 27-6-0, paragraph 16 on page, 15 dated Aug. 27/62, and page 17, dated Feb. 15/63 (or subsequent).

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

Page 17, delete last two sentences in portion of paragraph 16 at top of page.

Changes in stabilizer trim raise or lower the stabilizer rear spar and rotate the transmitter input shaft to a new position. The synchro motor assumes the same position as the transmitter and the indicator pointer indicates the current trim setting of the stabilizer. The indicator is calibrated in degrees to correspond to the trim angle of the stabilizer and is placarded NOSE UP at the top of the dial and NOSE DOWN at the bottom.

14. Stabilizer Electric Trim Limit Switches

Mounted at the same location as the position transmitter, and actuated by the same push-pull rod, are three microswitches (see Figure 8). The push-pull rod is connected to an arm which actuates the three microswitches. The fore and aft microswitches shut off electric power to the electrical standby motor to limit the travel of the horizontal stabilizer. The center switch causes a horn to blow intermittently in the flight compartment if a takeoff is attempted with the stabilizer trim position outside the prescribed limits.

15. Mach Trim Augmentation System

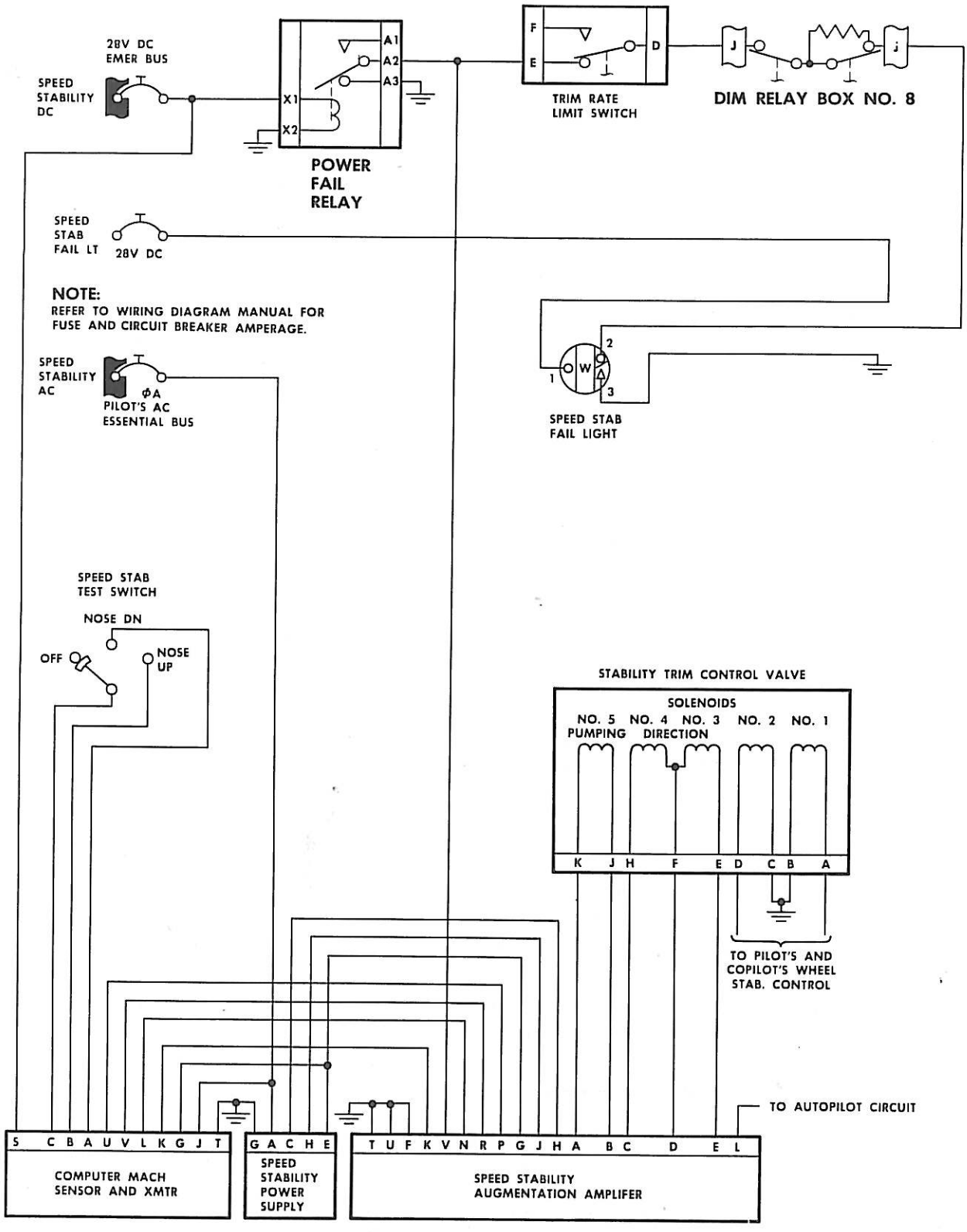
The Mach trim augmentation system consists of the Mach computer, Mach trim augmentation amplifier, the Mach trim power supply, and the Mach trim portion of the stabilizer trim control valve (see Figure 9). The power supply, amplifier, and computer are mounted on the autopilot equipment rack at station 341. The Mach trim augmentation system adjusts the stabilizer automatically to counteract the tendency of the airplane to become nose heavy at speeds between 0.80 and 0.95 Mach.

Pitot and static air pressures are routed to the Mach computer. The information is computed and then transformed from its natural analog function into digital signals (step or pulse voltage signals). These signals are used by the amplifier to control the Mach trim portion of the horizontal stabilizer trim control valve. On command from the amplifier the control valve releases a measured quantity of hydraulic fluid to the stabilizer hydraulic motor. The motor then drives the stabilizer leading edge a specified number of degrees (0.072 degrees per signal) in the direction commanded by the Mach computer. The leading edge of the stabilizer is lowered for increased Mach and raised for decreasing Mach. The sytem is interlocked to a "standby" condition during autopilot controlled flight.

A test switch on the pilot's instrument panel is provided for simulating increasing or decreasing Mach number for pre-flight check of the Mach Trim augmentation system.

16. Stabilizer Travel and Trim Rates

The stabilizer trim range extends from 2-1/2 (±1/4) degrees trailing edge down to 13.25 (±1/4) degrees trailing edge up. Stabilizer trim rate varies with the system used and the position of the flaps. Rate cams in the control unit regulate the trim rate of the stabilizer. The trim rate varies with flap position when the normal control trim lever or the normal electric trim switch on the pilots' control wheels is actuated. The trim rate


28V DC
EMER BUS
SPEED
STABILITY
DC
A1
A2
A3
X1
X2
POWER
FAIL
RELAY
F
E
D
TRIM RATE
LIMIT SWITCH
J
j
DIM RELAY BOX NO. 8
SPEED
STAB
FAIL LT
28V DC
NOTE:
REFER TO WIRING DIAGRAM MANUAL FOR
FUSE AND CIRCUIT BREAKER AMPERAGE.
SPEED
STABILITY
AC
ΦA
PILOT'S AC
ESSENTIAL BUS
W
1
2
3
SPEED STAB
FAIL LIGHT
SPEED STAB
TEST SWITCH
NOSE DN
OFF
NOSE
UP
STABILITY TRIM CONTROL VALVE
SOLENOIDS
NO. 5
PUMPING
NO. 4
NO. 3
DIRECTION
NO. 2
NO. 1
K J H F E D C B A
TO PILOT'S AND
COPILOT'S WHEEL
STAB. CONTROL
TO AUTOPILOT CIRCUIT
S C B A U V L K G J T
COMPUTER MACH
SENSOR AND XMTR
G A C H E
SPEED
STABILITY
POWER
SUPPLY
T U F K V N R P G J H A B C D E L
SPEED STABILITY
AUGMENTATION AMPLIFER

30 30 27 041B

is 0.53 (+0.02), -0.03) degree per second when the flaps are extended beyond 3.0 (±2.0) degrees. With the flaps extended less than 3.0 (±2.0) degrees the trim rate is 0.25 (±0.04) degree per second. Stabilizer normal electric trim is interrupted for approximately 0.5 second when the trim rate change solenoid is actuated at 3.0 (±2.0) degrees of flap deflection. This interruption is to ensure that the rate change mechanism in the stabilizer control unit is free to move.

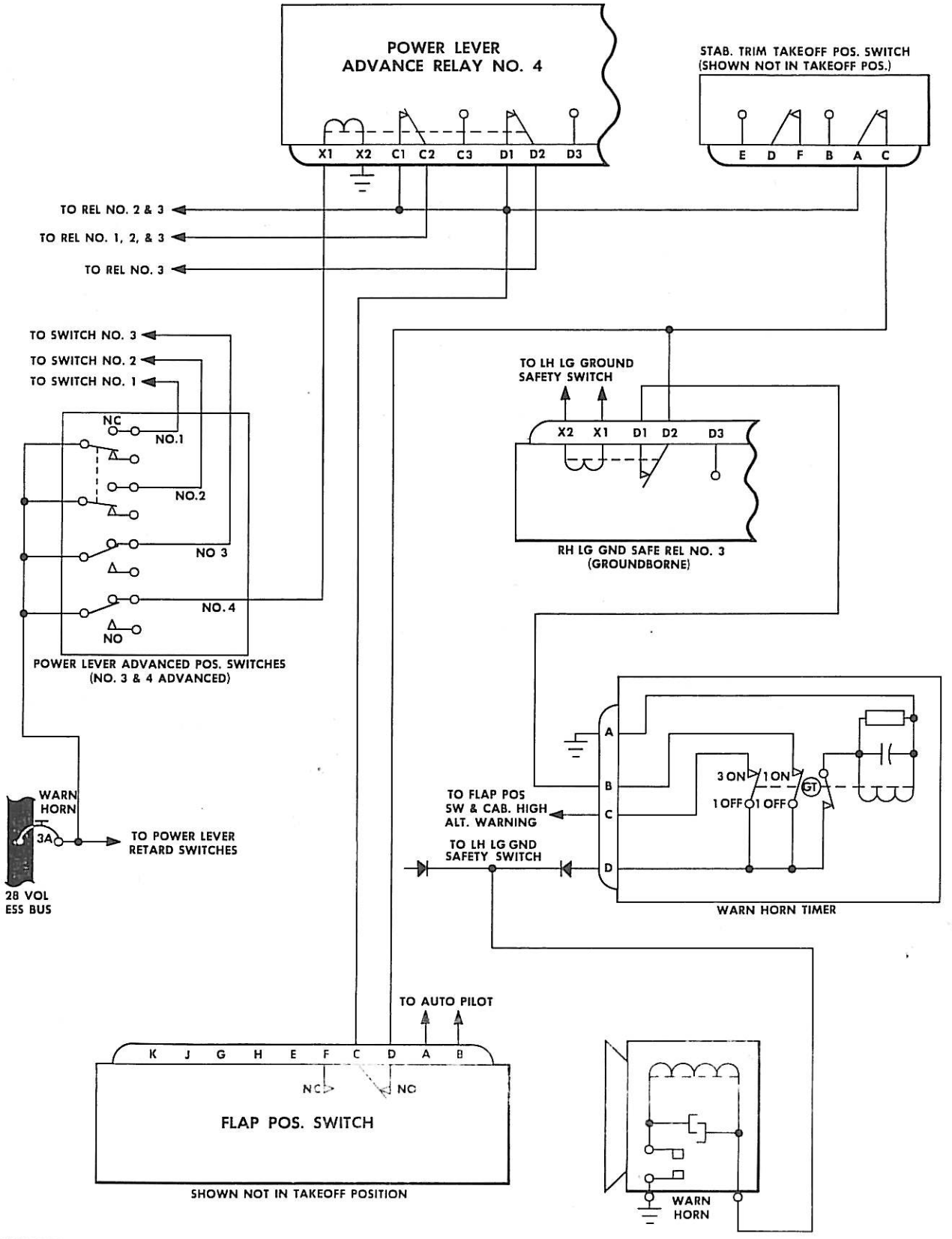
The emergency electrical trim rate is 0.12 (±0.01) degree per second and on autopilot control the trim rate is 0.077 (±.005) degree per second.

17. Stabilizer Warning Horn for Takeoff Trim

A cam mounted on the arm of the synchro transmitter of the stabilizer position indicator system closes a switch in the warning horn circuit whenever the pilot begins to take off with the stabilizer setting outside of the specified takeoff range. The warning horn will sound "1 second on - 1 second off" when two or more power levers are advanced to 92 percent power if the stabilizer setting is not between 0.75(+0.5, -0.0) degrees "nose down" and 7.0 (+0.5, -0.0) degrees "nose up".

18. Stabilizer Motion Indicator and Audible Warning

Movement of the stabilizer is transmitted by a cable system and flexible shaft from the stabilizer control unit to the stabilizer motion indicator on the left side of the pilots' pedestal. The flexible shaft at the pilots' pedestal turns a drive gear which operates a "clacker" gear for audible motion indication and also turns a lighted motion indicator dial. The motion indicator dial is adjacent to the pilots' stabilizer trim control lever and turns in the direction of stabilizer movement. The audible warning indicator sounds approximately ten times per degree of stabilizer movement.


POWER LEVER
ADVANCE RELAY NO. 4
X1 X2 C1 C2 C3 D1 D2 D3
STAB. TRIM TAKEOFF POS. SWITCH
(SHOWN NOT IN TAKEOFF POS.)
E D F B A C
TO REL NO. 2 & 3
TO REL NO. 1, 2, & 3
TO REL NO. 3
TO SWITCH NO. 3
TO SWITCH NO. 2
TO SWITCH NO. 1
NC
NO.1
NO.2
NO 3
NO.4
NO
POWER LEVER ADVANCED POS. SWITCHES
(NO. 3 & 4 ADVANCED)
TO LH LG GROUND
SAFETY SWITCH
X2 X1 D1 D2 D3
RH LG GND SAFE REL NO. 3
(GROUNDBORNE)
WARN
HORN
3A
TO POWER LEVER
RETARD SWITCHES
28 VOL
ESS BUS
TO FLAP POS
SW & CAB. HIGH
ALT. WARNING
TO LH LG GND
SAFETY SWITCH
A
B
C
D
3 ON
1 ON
1 OFF
1 OFF
WARN HORN TIMER
TO AUTO PILOT
K J G H E F C D A B
NC
NC
FLAP POS. SWITCH
SHOWN NOT IN TAKEOFF POSITION
WARN
HORN

30.30.27.044

HORIZONTAL STABILIZER TRIM SYSTEM - TROUBLE SHOOTING

NOTE: Before trouble shooting the horizontal stabilizer trim system, external source of electrical power must be connected to the airplane, the AC and DC SPEED STABILITY, STAB TRIM CONT, STAB TRIM CONT EMER, STAB TRIM RATE, and STAB POS IND circuit breakers on the main circuit breaker panel must be closed, the 28-volt dc ESSENTIAL, 28-volt dc emergency, 26-volt ac instrument, and 115/200-volt ac pilot's instrument buses must be energized, and the airplane's hydraulic systems must be pressurized.

CAUTION: WHEN CHECKING ELECTRICAL CIRCUITS AT PERMANENT SPLICES, USE PIN-TYPE PROBE AND AVOID STRETCHING SPLICE SHEATH.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
1. STABILIZER STICKS IN SOME INTERMEDIATE POSITION	
A. Moving part of screw jack or stabilizer coming in contact with some obstruction.	Actuate stabilizer using emergency trim crank and observe travel of screw jack and stabilizer moving components. Locate point at which undue force is required to move stabilizer and identify and remove obstruction.
B. Insufficient clearance between moving components of screw jack actuator.	Check for clearance between stabilizer and fuselage structure at maximum NOSE UP and NOSE DOWN positions. Check for clearance between screw jack upper housing and stabilizer front spar fitting with screw jack fully extended.
2. STABILIZER TRIM RATE DOES NOT INCREASE WHEN FLAPS ARE LOWERED MORE THAN 3 DEGREES	
A. Stabilizer trim rate solenoid or stabilizer trim rate limiting hook stuck in solenoid extended position.	Open STAB TRIM RATE CONT circuit breaker and check that stabilizer trim rate solenoid can be moved manually to extended position. If unable to move solenoid, disconnect trim rate limiting hook arm from solenoid and check for free movement of limiting hook. If unable to move hook, replace stabilizer trim control unit. If hook moves freely, replace stabilizer trim rate control solenoid.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
2. STABILIZER TRIM RATE DOES NOT INCREASE WHEN FLAPS ARE LOWERED MORE THAN 3 DEGREES (CONT)	
B. No electrical power being supplied to stabilizer trim rate system.	Check for voltage at STAB TRIM RATE CONT circuit breaker bus terminal. If no voltage, energize 28-volt dc essential bus. If voltage, close STAB TRIM RATE CONT circuit breaker and check for voltage at output terminal of circuit breaker. If no voltage, replace circuit breaker. If voltage, trouble is elsewhere.
C. Stabilizer trim rate switch or related wiring defective.	Remove electrical plug from stabilizer trim rate switch on flap central drive gearbox and check for voltage at pin "L". If no voltage, repair or replace wire connecting stabilizer trim rate switch and STAB TRIM RATE CONT circuit breaker. If voltage at pin "L" of stabilizer trim rate switch plug, actuate flaps to full down position, replace switch electrical plug, unplug STAB TRIM RATE CONT relay in electrical compartment, and check for voltage at pin "X1". If no voltage, check continuity of wire connecting pin "X1" of STAB TRIM RATE CONT relay to pin "N" of stabilizer trim rate switch. If no continuity, repair or replace wire connecting switch and relay. If continuity, replace stabilizer trim rate switch.
D. STAB TRIM RATE CONT relay or related electrical circuits defective.	With STAB TRIM RATE CONT relay unplugged, check for voltage at pin "B1". If no voltage, repair or replace wire connecting pin "B1" of relay to STAB TRIM RATE CONT circuit breaker. If voltage, plug in STAB TRIM CONT relay, remove electrical plug from stabilizer trim rate control solenoid at stabilizer trim control unit in tail cone of airplane, and check for voltage at pin "A". If no voltage at pin "A" of solenoid plug, check continuity of wire connecting pin "A" of solenoid plug and pins "A2" and "B2" of STAB TRIM RATE CONT relay. If no continuity, repair or replace wiring as necessary. If continuity, replace STAB TRIM RATE CONT relay.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
2. STABILIZER TRIM RATE DOES NOT INCREASE WHEN FLAPS ARE LOWERED MORE THAN 3 DEGREES (CONT)	
E. Stabilizer trim rate control solenoid defective.	If voltage at pin "A" of stabilizer trim rate control solenoid plug, check continuity between pin "B" of solenoid plug and ground. If no continuity, repair or replace solenoid ground wire as necessary. If continuity, replace stabilizer trim rate control solenoid.
3. STABILIZER TRIM RATE DOES NOT DECREASE WHEN FLAPS ARE RAISED ABOVE 3 DEGREES	
A. Stabilizer trim rate switch defective.	Close STAB TRIM RATE CONT circuit breaker, actuate flaps to raised position, unplug STAB TRIM RATE CONT relay in electrical compartment, and check for voltage at pin "X1". If voltage, replace stabilizer trim rate switch. If no voltage, trouble is elsewhere.
B. STAB RATE CONT relay defective.	Plug in STAB TRIM RATE CONT relay, disconnect electrical plug from stabilizer trim rate solenoid, and check for voltage at pin "A". If voltage, replace STAB TRIM RATE CONT relay. If no voltage, trouble is elsewhere.
C. Stabilizer trim rate solenoid or stabilizer trim rate limiting hook defective.	Open STAB TRIM RATE CONT circuit breaker and check that stabilizer trim rate solenoid is in retracted position. If not, disconnect hook from solenoid and check hook for free movement. If unable to move hook, replace stabilizer trim rate control unit. If unable to move solenoid plunger, replace solenoid.
4. WARNING HORN DOES NOT SOUND WHEN STABILIZER IS NOT TRIMMED CORRECTLY FOR TAKEOFF	
A. WARN HORN circuit breaker not closed or defective.	Close WARN HORN circuit breaker and check for voltage at circuit breaker terminals. If no voltage at bus terminal of circuit breaker, energize 28-volt dc emergency bus. If voltage at bus terminal of circuit breaker but not at output terminal, replace circuit breaker. If voltage at both circuit breaker terminals, trouble is elsewhere.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
4. WARNING HORN DOES NOT SOUND WHEN STABILIZER IS NOT TRIMMED CORRECTLY FOR TAKEOFF (CONT)	
B. Power lever advance relays not functioning properly.	With airplane on ground, open any two power levers beyond MAX CRUISE position. Disconnect electrical connector from No. 4 power lever advance relay in electronics compartment and check for voltage at D1 connector pin. If voltage present, trouble is elsewhere. If no voltage, successively advance different pairs of power levers until all six power lever combinations have been tested. Replace defective relays or repair connecting circuits as indicated.
C. Stabilizer position switch or connecting circuit defective.	With two power levers advance beyond MAX CRUISE position and stabilizer in position other than between 2 and 6 degrees, disconnect electrical connector from No. 3 right landing gear ground safety relay and check for voltage at D1 pin of connector. If no voltage present, check switch and circuit for continuity. Repair electrical wiring or replace stabilizer trim switch as indicated. If voltage present at D1 pin, trouble is elsewhere.
D. No. 3 RH LG GND SAFE relay defective.	Close LDG GEAR GRN SAFETY SW circuit breakers. With two power levers advanved beyond MAX CRUISE position and stabilizer in position other than between 2 and 6 degrees, disconnect electrical connector from warning horn timer in electronics compartment and check for voltage at D pin of electrical connector. If no voltage present, check ground safety switch and connecting circuit for continuity and repair wiring or replace switch as indicated. If voltage present, trouble is elsewhere.
E. Warning horn timer at connecting circuit defective.	Check for voltage at warning horn power terminal. If no voltage, check warning horn circuit for continuity and repair wiring or replace warning horn timer as indicated. If voltage present, check for voltage at warning horn ground terminal. If no voltage present, replace warning horn. If voltage present, repair or replace ground circuit.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
5. STABILIZER DOES NOT MOVE WHEN "STAB TRIM" LEVERS ARE ACTUATED	
A. Stabilizer screw jack jammed.	Using emergency trim crank, move stabilizer up and down through full range to check freedom of movement. If stabilizer sticks in some intermediate position, replace stabilizer screw jack actuator. If stabilizer moves freely, trouble is elsewhere.
B. Mechanical linkage to stabilizer trim hydraulic valve defective.	Actuate STAB TRIM levers fore and aft and check that input bell crank in stabilizer control unit and valve arm move in unison with STAB TRIM levers. If not, adjust mechanical linkage as necessary. If so, trouble is elsewhere.
C. Stabilizer trim hydraulic valve or hydraulic motor defective.	Depressurize hydraulic systems (refer to Chapter 12, SERVICING). Connect pressure gages in hydraulic motor couplings and pressurize hydraulic systems (refer to Chapter 29, HYDRAULIC POWER). Actuate STAB TRIM levers fore and aft and check hydraulic pressure differential as indicated by gages. If pressure differential low or lacking, replace stabilizer trim hydraulic valve. If pressure differential normal, replace hydraulic motor.
6. STABILIZER DOES NOT RESPOND TO "ELEC STBY STAB CONT" SWITCH ON PILOTS' PEDESTAL	
A. STAB TRIM CONT EMER circuit breaker open or defective.	Close STAB TRIM CONT EMER circuit breaker and check for voltage at bus terminal of circuit breaker. If no voltage, energize 28-volt dc emergency bus. If voltage, check for voltage at terminal No. 1 of circuit breaker. If no voltage at terminal No. 1, replace circuit breaker. If voltage at terminal No. 1, trouble is elsewhere.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
6. STABILIZER DOES NOT RESPOND TO "ELEC STBY STAB CONT" SWITCH ON PILOTS' PEDESTAL (CONT)	
B. Stabilizer trim shutoff valve or related electrical circuits defective.	Actuate STAB TRIM SEL switch to ELEC STBY position and listen at stabilizer trim shutoff valve in hydraulics compartment for audible click when valve closes. If click not detected, actuate STAB TRIM SEL switch to HYD position and listen for click when valve opens. If valve does not appear to be functioning, actuate STAB TRIM SEL switch to ELEC STBY position, disconnect electrical plug from stabilizer trim shutoff valve, and check for voltage at pin "A" of valve plug. If voltage at pin "A" of valve plug, check continuity of wire connecting pin "B" of valve plug and ground. If no continuity, repair or replace wire connecting pin "B" of valve plug and ground. If continuity in ground wire, replace stabilizer trim shutoff valve. If no voltage at pin "A" of valve plug, check continuity of wire connecting STAB TRIM CONT EMER circuit breaker and input of STAB TRIM SEL switch. If no continuity, repair or replace wiring as necessary. If continuity, check continuity of wire connecting output of STAB TRIM SEL switch and pin "A" of stabilizer trim shutoff valve. If no continuity, repair or replace wiring as necessary. If continuity, replace stabilizer trim shutoff valve.
C. Emergency stabilizer trim motor electrical circuits not energized.	Check for voltage at input and output terminals of stabilizer trim electrical motor fuses in ac power distribution box. If no voltage at input terminals, energize No. 3 essential ac bus. If no voltage at any fuse output terminal, replace 5-ampere fuses as indicated. Unplug No. 1 STAB TRIM ELEC MOTOR relay in electrical compartment and check for voltage at pins "C3", "B3", and "A2". If no voltage, repair or replace wiring as necessary. If voltage at all pins, trouble is elsewhere.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
6. STABILIZER DOES NOT RESPOND TO "ELEC STBY STAB CONT" SWITCH ON PILOTS' PEDESTAL (CONT)	
D. ELEC STBY STAB CONT switch or related electrical circuits defective.	Actuate STAB TRIM SEL switch to ELEC STBY position and unplug No. 1 STAB TRIM ELEC MOTOR relay. Actuate and hold ELEC STBY STAB CONT switch in NOSE DN position and check for voltage at pin "X1" of relay plug. If no voltage at pin "X1" of relay plug, check continuity of wire connecting output of STAB TRIM SEL switch and input of ELEC STBY STAB CONT switch. If no continuity, repair or replace wiring as necessary. If continuity, check continuity of wire connecting output of ELEC STBY STAB CONT switch and pin "X1" of No. 1 STAB TRIM ELEC MOTOR relay. If no continuity, repair or replace wiring as necessary. If continuity, replace ELEC STBY STAB CONT switch. Unplug No. 2 STAB TRIM ELEC MOTOR relay, actuate and hold ELEC STBY STAB CONT switch in NOSE UP position, and check for voltage at pin "X1" of No. 2 relay. If no voltage, check continuity of wire connecting output of STAB TRIM SEL switch and pin "X1" of No. 2 relay. If no continuity, repair or replace wiring as necessary. If continuity, replace ELEC STBY STAB CONT switch.
E. Stabilizer upper or lower limit switches or related electrical circuits defective.	If voltage at pin "X1" of STAB TRIM ELEC MOTOR No. 1 and 2 relays, plug in No. 1 and 2 STAB TRIM ELEC MOTOR relays, disconnect electrical plug from stabilizer upper and lower limit switches in tail cone of airplane, and check that stabilizer is set in some intermediate position. Actuate and hold ELEC STBY STAB CONT switch in NOSE DN position and check for voltage at pin "A" of stabilizer upper limit switch. If voltage, check continuity between pin "B" of switch plug and ground. If no continuity, repair or replace ground wire as necessary. If continuity, check continuity through upper limit switch between "A" and "B" terminals. If continuity through switch, trouble is elsewhere.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
6. STABILIZER DOES NOT RESPOND TO "ELEC STBY STAB CONT" SWITCH ON PILOTS' PEDESTAL (CONT)	
	Actuate and hold ELEC STBY STAB CONT switch in NOSE UP position and check for voltage at pin "A" of stabilizer lower limit switch. If voltage, check continuity through switch and from pin "B" to ground and repair ground wire or replace lower limit switch as indicated.
F. No. 2 STAB TRIM ELEC MOTOR relay or related electrical circuits defective.	If voltage at pin "X1" of No. 2 STAB TRIM ELEC MOTOR relay when ELEC STBY STAB CONT switch is held in NOSE UP position, plug in No. 2 relay, disconnect electrical plug from stabilizer lower limit switch, and check for voltage at pin "A". If no voltage, check continuity of wire connecting pin "A" of switch plug and pin "X2" of relay plug. If no continuity, repair or replace wiring as necessary. If continuity, check continuity through relay between "X1" and "X2" terminals. If no continuity, replace No. 2 STAB TRIM ELEC MOTOR relay. If continuity, trouble is elsewhere.
	Plug in No. 2 STAB TRIM ELEC MOTOR relay, disconnect electrical plug from emergency stabilizer trim motor, actuate and hold ELEC STBY STAB CONT switch in NOSE UP position, and check for voltage at pins "A", "B", and "C" of trim motor plug. If no voltage, check continuity of wires connecting motor plug pins "A", "B", and "C" with No. 2 relay pins "C1", "B1", and "A1". If no continuity in any circuit, repair or replace wiring as necessary. If continuity in all wires, unplug No. 1 STAB TRIM ELEC MOTOR relay and check continuity of wires connecting pins "A1", "B1", and "C1" of No. 1 relay plug to pins "C1", "B1", and "A1" of No. 2 relay plug. If no continuity in any wire, repair or replace wiring as necessary. If continuity in all wires, replace No. 2 STAB TRIM ELEC MOTOR relay.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
6. STABILIZER DOES NOT RESPOND TO "ELEC STBY STAB CONT" SWITCH ON PILOTS' PEDESTAL (CONT)	
G. No. 1 STAB TRIM ELEC MOTOR relay or related electrical circuits defective.	If voltage at pin "X1" of No. 1 STAB TRIM ELEC MOTOR relay when ELEC STBY STAB CONT switch is held on NOSE DN position, plug in No. 1 relay, disconnect electrical plug from stabilizer upper limit switch, and check for voltage at pin "A". If no voltage at pin "A" of switch plug, check continuity of wire connecting pin "A" of switch plug and pin "X2" of No. 1 relay. If no continuity, repair or replace wiring as necessary. If continuity, check continuity through relay between pins "X1" and "X2" terminals. If no continuity, replace No. 1 STAB TRIM ELEC MOTOR relay. If continuity, trouble is elsewhere. Plug in No. 1 STAB TRIM ELEC MOTOR relay, actuate and hold ELEC STBY STAB CONT switch in NOSE DN position, and check for voltage at pins "A", "B", and "C" of trim motor plug. If no voltage, check continuity of wires connecting motor plug pins "A", "B", and "C" with No. 1 relay pins "A1", "B1", and "C1". If no continuity in any circuit, repair or replace wiring as necessary. If continuity in all wires, replace No. 1 STAB TRIM ELEC MOTOR relay.
H. Emergency stabilizer trim motor or related electrical circuits defective.	Disconnect electrical plug from emergency stabilizer trim motor, actuate STAB TRIM SEL switch to ELEC STBY position, actuate and hold ELEC STBY STAB CONT switch in NOSE UP position, and check for voltage at pins "A", "B", and "C" of motor plug. If voltage at all motor plug pins, check continuity of wire connecting pin "D" of motor plug to ground. If no continuity, repair or replace ground wire. If continuity, replace emergency stabilizer trim motor.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
7. PILOT'S "STABILIZER TRIM" SWITCH DOES NOT OVERRIDE COPILOT'S "STABILIZER TRIM" SWITCH	
A. STAB TRIM HYD ELEC OV'RIDE relay faulty.	Close STAB TRIM CONT circuit breaker and disconnect electrical connector from STAB TRIM HYD ELEC CONT relay. Hold pilot's STABILIZER TRIM switch in NOSE DOWN position and hold copilot's STABILIZER TRIM switch in NOSE UP position. Check for voltage at pin B3 of STAB TRIM HYD ELEC CONT relay connector. If voltage present, replace STAB TRIM HYD ELEC OV'RIDE relay. Hold pilot's STABILIZER TRIM switch in NOSE UP position and copilot's STABILIZER TRIM switch in NOSE DOWN position. Check for voltage at pins A1 and X1 of STAB TRIM HYD ELEC CONT relay connector. If voltage present at either pin, replace STAB TRIM HYD ELEC OV'RIDE relay.

STABILIZER SPEED STABILITY SYSTEM - TROUBLE SHOOTING

1. EQUIPMENT REQUIRED

   A. External source of electrical power.

   B. External source of hydraulic power.

   C. Vacuum-tube voltmeter.

   D. Ohmmeter for continuity checks.

   E. A Megger testing device.

   F. MB-1 pitot/static tester or equivalent.

2. PREPARATION

   A. Connect external source of Electrical power to airplane and close FLAP ASYM CONT circuit breaker on main circuit breaker panel (refer to Chapter 24, ELECTRICAL POWER).

   B. Check that setting of flap control lever corresponds roughly with position of flaps, connect external source of hydraulic power to airplane, and pressurize hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

   C. Close AUTO PLT TRIM & TRIM RATE LIMIT (HYD), SPEED STAB FAIL LT, and AC and DC SPEED STABILITY circuit breakers on main circuit breaker panel.

      NOTES: Wiring diagram of the speed stability system appears in 27-6-0, Figure 7, and in the Wiring Diagram Manual. Continuity of electrical circuits can be checked with an ohmmeter or a Megger tester.

      Usually a discrepancy report on the speed stability system will stem from a malfunctioning component. Consequently, considerable time can often be saved by omitting the continuity checks from the trouble shooting procedures.

      CAUTION: DO NOT USE MEGGER TESTER ON SPEED STABILITY SYSTEM COMPONENTS. DAMAGE TO SEMICONDUCTORS IN THE EQUIPMENT MIGHT RESULT.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
3. SYSTEM FUNCTIONS NORMALLY BUT "SPEED STAB FAIL" LIGHT ILLUMINATES	
A. Speed stability amplifier defective.	Open speed stability circuit breakers and detach electrical plug P-361 from speed stability amplifier. Close AC and DC SPEED STABILITY and SPEED STAB FAIL LT circuit breakers and check that SPEED STAB FAIL light illuminates. If not, install new speed stability amplifier.
B. Speed stability PWR FAIL relay defective.	If SPEED STAB FAIL light illuminates, remove speed stability PWR FAIL relay K-279. If SPEED STAB FAIL light does not illuminate, check the +28 volts dc at pin X1 of PWR FAIL relay socket XK-167. If voltage present, install new PWR FAIL relay.
C. Speed stability warning circuit defective.	If no voltage present at pin X1 of PWR FAIL relay, check continuity at permanent splice at FS323C (04) of wires C611C20 and C611A20 and repair wiring as indicated. If SPEED STAB FAIL light still illuminates, check continuity of wires C632, C633 and C634 and repair as indicated.
4. "SPEED STAB FAIL" LIGHT DOES NOT ILLUMINATE DURING POWER FAIL CHECK	
A. Speed stability amplifier, speed stability PWR FAIL relay, or warning circuit defective.	Conduct trouble shooting procedure set forth in paragraph 3.
5. SPEED STABILITY SYSTEM DOES NOT FUNCTION AND "SPEED STAB FAIL" LIGHT INDICATES A MALFUNCTION	
A. Speed stability power supply, speed stability amplifier, or power circuitry defective.	Check for +28 volts dc at DC SPEED STABILITY circuit breaker CB-155. If no voltage, correct circuit or replace circuit breaker as indicated. If voltage at circuit breaker, disconnect electrical plug P-1010 from Mach computer and check for +28 volts dc from pin S to pin T. If no voltage, correct defect in wire C614 from pin T to airplane ground or in wire C611 from pin S to AC SPEED STABILITY circuit breaker.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
5. SPEED STABILITY SYSTEM DOES NOT FUNCTION AND "SPEED STAB FAIL" LIGHT INDICATES A MALFUNCTION (CONT)	
	If voltage from pin S to pin T, check for 115 volts ac at AC SPEED STABILITY circuit breaker CB-154. If no voltage, correct faulty circuit or replace circuit breaker.
	If voltage at AC SPEED STABILITY circuit breaker, disconnect P-348 from speed stability power supply. Electrical plug P-1010 is still disconnected from Mach computer. Check for 115 volts ac from pin J to pin T of P-1010 and from pin A to pin G of P-348. If no voltage at pin A of P-348, check continuity of wire C610 from pin A of P-348 to circuit breaker CB-154 and from pin G to ground. Repair wiring as indicated.
	Reconnect P-348 to power supply and disconnect P-361 from speed stability amplifier. Check for +32 volts dc from pin G to pin J of P-361. If no voltage from pin G to pin J, disconnect P-348 from speed stability power supply, conduct the following continuity checks, and repair wiring as indicated: (a) From pin E of P-348 to pin C of P-361. (b) Wire C617 from pin H of P-348 to pin J of P-361. (c) Wire C612 from pin V of P-1010 to pin R of P-361.
	Using ohmmeter, check continuity between pins U and R, U and J, U and D, and U and B of speed stability amplifier receptacle. If checks not satisfactory, replace amplifier unit.
	If checks satisfactory, check continuity of wire C624 from pin U of P-361 to airplane ground. If check not satisfactory, repair wiring. If check satisfactory, replace speed stability power supply unit.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION

5. SPEED STABILITY SYSTEM DOES NOT FUNCTION AND "SPEED STAB FAIL" LIGHT INDICATES A MALFUNCTION (CONT)

If voltage found between pins G and J of P-361, reconnect P-348 and P-1010 and check that P-361 is still disconnected from amplifier. Check for -12 volts dc from pin H to pin J of P-361. If no voltage, disconnect P-348 from speed stability power supply and check continuity of wire C618 from pin H of P-361 to pin C of P-348. If check not satisfactory, repair wiring as indicated. If satisfactory, replace power supply unit. Reconnect P-361 and P-348.

6. SPEED STABILITY SYSTEM FUNCTIONS NORMALLY BUT BEGINS TO SCHEDULE STABILIZER MOTION BELOW 0.705 MACH

A. Mach number computing portion of system defective.

NOTE: If discrepancy was detected during flight, check that airplane Mach meters are within their accuracy requirements before proceeding.

Check for leaks or restrictions in airplane auxiliary static system and copilot pitot system. If check satisfactory, replace Mach computer. If check not satisfactory, correct pitot or static system discrepancy.

7. SPEED STABILITY SYSTEM FUNCTIONS NORMALLY OVER ONLY A PORTION OF RANGE FROM 0.705 TO 0.93 MACH

A. Mach computing portion of speed stability system defective.

Locate and correct discrepancy as set forth in paragraph 6A.

8. SPEED STABILITY SYSTEM FUNCTIONS WHEN AUTOPILOT IS ENGAGED

A. Autopilot speed stability interlock circuitry defective.

Check for +28 volts dc at AUTO PLT TRIM & TRIM RATE LIMIT (HYD) circuit breaker. If no voltage replace circuit breaker or repair wiring as indicated. If voltage at circuit breaker, disconnect electrical plug P-361 from

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION

8. SPEED STABILITY SYSTEM FUNCTIONS WHEN AUTOPILOT IS ENGAGED (CONT)

speed stability amplifier and engage autopilot. Check for +28 volts dc from pin L to pin F of P-361. If voltage, replace speed stability amplifier.

If no voltage from pin L to pin F of P-361, disengage autopilot and check for continuity between pin F of P-361 and airplane ground. If no continuity, correct fault in circuit. If continuity, disconnect P-397 from autopilot controller and check continuity from pin 38 of P-397 to pin L of 361. If no continuity, correct fault in circuit.

If continuity between pins 38 of P-397 and L of P-361, check for +28 volts dc between pins 37 and 1 of P-397. If voltage, replace autopilot controller.

NOTE: With this discrepancy, it is unlikely that autopilot will stay engaged.

If no voltage between pins 37 and 1 of P-397, correct fault in circuit C361 between autopilot controller and AUTO PLT TRIM & TRIM RATE LIMIT (HYD) circuit breaker CB-183. Reconnect P-361 into speed stability amplifier and P-397 into autopilot controller.

9. SYSTEM FUNCTIONS NORMALLY DURING FLIGHT BUT STABILIZER DOES NOT MOVE DURING PREFLIGHT TEST

A. Speed stability Mach computer defective.

NOTE: If stabilizer moves in one direction but not in the other, only the applicable portion of the following procedure need be conducted.

Disconnect electrical plug P-1010 from Mach computer. With SPEED STAB TEST switch in OFF position, check that there is no continuity between pins A and B, between pins A and C, and between B and C of P-1010. With SPEED STAB TEST switch in NOSE DN position, check that

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
9. SYSTEM FUNCTIONS NORMALLY DURING FLIGHT BUT STABILIZER DOES NOT MOVE DURING PREFLIGHT TEST (CONT)	
	there is no continuity between pins B and C and B and A and that there is continuity between pins A and C of P-1010. With SPEED STAB TEST switch in NOSE UP position, check that there is continuity between pins A and B, pins A and C, and pins B and C of P-P-1010. If foregoing continuity checks are satisfactory, replace Mach computer.
B. SPEED STAB TEST switch or connecting circuits defective.	If continuity checks in paragraph 9A are satisfactory, remove three wires from connector pins on SPEED STAB TEST switch and check that P-1010 is still disconnected. With SPEED STAB TEST switch in OFF position, check that there is no continuity from pin 4 to pin 2 or from pin 4 to pin 3 and that there is continuity from pin 4 to pin 1 of SPEED STAB TEST switch. With SPEED STAB TEST switch in NOSE DN position, check that there is continuity from pin 4 to pin 1 and from pin 4 to pin 2 and that there is no continuity from pin 4 to pin 3 of switch. With SPEED STAB TEST switch in NOSE UP position, check that there is continuity from pin 4 to pin 2 and from pin 4 to pin 3 and that there is no continuity from pin 4 to pin 1 of switch. If continuity checks are not satisfactory, replace SPEED TAB TEST switch. If foregoing continuity checks are satisfactory, check that wire C630 connects pin 4 of SPEED STAB TEST switch to pin C of P-1010, that wire C629 connects pin 3 of SPEED STAB TEST switch to pin B of P-1010, and that wire C628 connects pin 2 of SPEED STAB TEST switch to pin A of P-1010. No wire should be connected to pin 1 of SPEED STAB TEST switch. Correct circuitry as indicated in foregoing checks and reconnect P-1010 to Mach computer.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION

10. SPEED STABILITY SYSTEM DOES NOT FUNCTION NORMALLY DURING FLIGHT

A. Speed stability power supply, speed stability amplifier, or power circuitry defective.

Proceed with trouble shooting procedure presented in paragraph 5A.

B. Electrical signal circuitry defective.

NOTE: The following checks can be performed using the MB-1 pitot and static tester connected to the Mach computer static port. Leaving the computer pitot port at ground pressure and "increasing altitude" with the MB-1 will simulate Mach number increase. Simulated altitude of 13,000 feet is the equivalent of approximately Mach 0.84. If MB-1 not available, SPEED STAB TEST switch may be used as follows:

(a) For checks with MB-1 at 8000 feet use test switch in OFF position.

(b) For checks with MB-1 increasing altitude from 8000 to 13,000 feet use test switch in NOSE UP position.

(c) For checks with MB-1 decreasing altitude from 13,000 to 8000 feet use test switch in NOSE DN position.

Disconnect electrical plug P-361 from speed stability amplifier, install jumper between pins R and J of P-361, and perform the following checks:

(a) Slowly increase MB-1 altitude to 13,000 feet and check that above approximately 9800 feet there are periodic short circuits from pin P to pin R, from pin N to pin R, and from pin K to pin R of P-361. Check that the open circuit resistance is greater than 500,000 ohms.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION

10. SPEED STABILITY SYSTEM DOES NOT FUNCTION NORMALLY DURING FLIGHT (CONT)

(b) Slowly decrease MB-1 altitude to 8000 feet and check that there are periodic short circuits from pins N, P, and K to pin R of P-361 above approximately 9800 feet.

If foregoing checks are not satisfactory, disconnect electrical plug P-1010 from Mach computer and perform the following continuity checks:

(a) Check continuity of wire C613 from pin U of P-1010 to pin P of P-361. If no continuity, correct faulty circuit.

(b) Check continuity of wire C627 from pin L of P-1010 to pin N of P-361. If no continuity, correct faulty circuit.

(c) Check continuity of wire C612 from pin V of P-1010 to pin R of P-361. If no continuity, correct faulty circuit.

(d) Check continuity of wire C638 from pin K of P-1010 to pin K of P-361. If no continuity, correct faulty circuit.

If foregoing checks are satisfactory, check for leaks or restrictions in the auxiliary static system and the co-pilot's pitot system. If check not satisfactory, correct fault in pitot-static system. If check satisfactory, replace Mach computer.

If foregoing MB-1 simulated altitude tests were satisfactory, connect P-1010 to Mach computer and P-361 to speed stability amplifier; disconnect P-362 from stabilizer trim control valve, and perform the following MB-1 simulated Mach number checks:

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION

10. SPEED STABILITY SYSTEM DOES NOT FUNCTION NORMALLY DURING FLIGHT (CONT)

(a) With MB-1 set at 8000 feet, check that there is less than 1.8 volts from pin E to pin F and from pin H to pin F of P-362. Voltage will normally be 0 volts. Also check that voltage from pin K to pin J of P-362 is either +25 to +30 volts dc or less than 1.8 volts dc.

(b) Slowly increase MB-1 altitude to 13,000 feet and check that above approximately 9800 feet the voltage from pin K to pin J of P-362 alternately steps from +25 to +30 volts dc to less than 1.8 volts dc and back to +25 to +30 volts dc. Also check that there are +voltage pulses from pin H to pin F and no voltage pulses from pin E to pin F of P-362.

(c) Slowly decrease MB-1 altitude to 8000 feet and check that above approximately 9800 feet, the voltage from pin K to pin J of P-362 alternately steps from +25 to +30 volts dc to less than 1.8 volts dc and back to +25 to +30 volts dc. Also check that there are + voltage pulses from pin E to pin F and no voltage pulses from pin H to pin F of P-362.

If foregoing checks are satisfactory and "beep" trim and pilot manual trim systems function properly, replace stabilizer trim control valve.

If foregoing checks are not satisfactory, disconnect P-361 from speed stability amplifier, check that P-362 is still disconnected from trim control valve, and perform the following continuity checks:

(a) Wire C619 from pin K of P-362 to pin A of P-361.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
10. SPEED STABILITY SYSTEM DOES NOT FUNCTION NORMALLY DURING FLIGHT (CONT)	
	(b) Wire C620 from pins J of P-362 to B of P-361. (c) Wire C621 from pins H of P-362 to C of P-361. (d) Wire C622 from pins F of P-362 to D of P-361. (e) Wire C623 from pins E of P-362 to E of P-361. If no continuity in any circuit, correct faulty circuit or circuits as indicated. If continuity in all circuits, replace speed stability amplifier. If it still does not function properly, replace Mach computer. NOTE: The Mach computer is replaced because of the inability to properly check the magnitude and wave shape of the voltage pulse output from the Mach computer without an oscilloscope. The same applies to the outputs of the speed stability amplifier but this component was replaced previously.
11. SPEED STABILITY SYSTEM DOES NOT FUNCTION NORMALLY DURING PREFLIGHT TEST	
A. The fault can be either in the system or in the pre-flight test switch circuitry.	Connect MB-1 pitot static tester to Mach computer static port and increase MB-1 altitude to 10,000 feet and check for stabilizer motion. If stabilizer does not move, proceed with trouble shooting checks set forth in Paragraph 10. If stabilizer moves, proceed with trouble shooting checks set forth in Paragraph 9.
12. SPEED STABILITY SYSTEM CIRCUIT BREAKERS "POP" OPEN	
A. Short to airplane ground or excessive current drain in system electrical power supply circuitry.	Using normal trouble shooting procedures, locate short to airplane ground or cause of excess current drain on power supply. Correct circuitry or replace component as indicated.

TEMPORARY REVISION NO. 27-54.

Insert facing 27-6-0, Page 201, dated Feb. 15/63 (or subsequent).

This temporary revision is applicable to Group I airplanes (refer to Manual INTRODUCTION for explanation of group designations).

For Group II airplanes use the information on 27-6-0, Page 201.

Page 201, delete step C.(1) and substitute the following:

(1) Check area for any obstruction that might interfere with operation of horizontal stabilizer, trailing edge flaps, or leading edge flaps and slats.